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# FIIDOS, A Computer Code for the Computation of Fallout Inhalation and Ingestion Dose to Organs Computer User's Guide (Revision 4)

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### 14. ABSTRACT

This report discusses the technical aspects of the computer code FIIDOS (Fallout Inhalation and Ingestion Dose to Organs, Version 4), describes user inputs and operations, and includes sample problems. This report updates the original FIIDOS Computer User's Guide published in 1985.

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# **SECTION 1**

### **OVERVIEW**

# 1.1 INTRODUCTION

This report discusses the technical aspects of the computer code FIIDOS (Fallout Inhalation and Ingestion Dose to Organs, Version 4), describes user inputs and operations, and includes sample problems. This report updates the original FIIDOS Computer User's Guide published in 1985 (DNA, 1985). The Nuclear Test Personnel Review (NTPR) Program uses FIIDOS to determine the dose to internal organs from the inhalation or ingestion of contaminants created by a nuclear detonation under various conditions common to participants in atmospheric nuclear testing and the occupation of Hiroshima and Nagasaki, Japan (NTPR, 2006). To do this, it calculates an internal dose in an organ from the intake of contaminants produced by a nuclear detonation, which is typically determined by relating the external gamma-ray intensity rate above a fallout field to the fallout contamination level on the ground surface. The intake of contaminants may also be determined from other measurements, including air-sampling data or radiation intensities within a debris cloud (while on the ground or in the air). It determines the dose from the mixture of activation products, actinides, and fission products in fallout. Doses from low-linear energy transfer (LET) radiation (beta particles and gamma rays) are reported separately from doses from high-LET (alpha particle) radiation.

The NTPR Program has prepared internal dose determinations since the early 1980s using methods incorporated into the FIIDOS code. Approaches to internal dose determination included estimates of airborne radioactivity concentrations based on ambient radiation dose (Lee, 1983 and Barrett, 1986). Other approaches included estimates based on analyses of fission products and plutonium in urine (SAIC, 1983). A review of those methods (NRC, 1985) concluded that personnel exposed to heavy fallout received internal doses that were much smaller than their external doses, with the possible exception of doses to the thyroid. The review also concluded that the methods for estimating internal doses were not as well developed or as scientifically defensible as the methods used to estimate external doses. These conclusions were based on a lack of data about the material inhaled or ingested by nuclear weapon test participants or occupation forces at Hiroshima or Nagasaki and on the reliability of certain assumptions used in the estimates. The review expressed concerns about fractionation of airborne radionuclides and deposited fallout, particle size distributions, and particle solubilities.

The concerns about internal dosimetry methods discussed in NRC's review (NRC, 1985) pertain to assumptions of various parameters required to estimate the dose to tissues and organs in the absence of measurements of radioactivity concentrations. Suggestions for the use of urine bioassay to estimate concentrations of radionuclides in the body combined with appropriate models to derive estimates of material inhaled or ingested

were apparently rejected as not feasible. The NTPR Program worked to re-evaluate assumptions about the critical parameters used in calculating internal doses – resuspension factor, breathing rate, fractionation, and scenario elements – to conclude that reasonable margins of high-siding were applied.

In the late 1990s, the NTPR Program studied whether bioassay testing using the measurement of plutonium in urine could be used to assess the reliability of the methods for estimating inhalation doses. The effort resolved numerous technical, analytical, and methodological issues, and collected and analyzed urine samples from about 100 veterans. Results of the assessments provided the source data for several papers on the analytical issues involved (e.g., Klemm, 2003). However, the results did not prove useful in providing an assessment of the reliability of the methods for estimating internal doses.

A more recent National Research Council review (NRC, 2003) evaluated methods for estimating internal dose and concluded that the methods had important shortcomings centered around three issues. First, the committee concluded that the reliability of methods for estimating concentrations of radionuclides based on measurements of external photon exposure had not been demonstrated. Second, the committee concluded that the lack of consideration of resuspension of previously deposited fallout by the blast wave and the neglect of fractionation in fallout could result in underestimates of inhalation dose. Third, the substantial uncertainty in dose coefficients for inhalation of radionuclides had not been taken into account. The committee summarized its evaluation of the methods for estimating inhalation dose by concluding that they do not consistently provide credible upper bounds. The committee also considered estimates of doses from ingestion of radionuclides, offered several examples of plausible scenarios, and concluded that ingestion was rarely considered in estimating internal dose.

# 1.2 HISTORY OF THE CODE

### **1.2.1 FIIDOS1**

The original version of FIIDOS, completed in 1985, was written in FORTRAN-IV for operation on a DEC PDP-11 mini-computer with problem input read from a keyboard and output directed to an off-line printer. The code required 32 kilobytes (Kb) of core memory and 100 Kb of external disk memory storage. A typical FIIDOS problem used 10 minutes of running time. Since 1985, with the substantial increases in the available computing power, FIIDOS has undergone a gradual evolution to a code that, though it still functions in much the same way, has substantially greater capabilities.

### **1.2.2 FIIDOS2**

### a. Overview

The first revision to FIIDOS in 1995, called FIIDOS2 included the following three significant changes:

1) ORIGEN2 - Oak Ridge Isotope Generation and Depletion Code, Version 2.1 (Croff, 1980), was integrated into the FIIDOS code and its input data modified. It was run using initial fission product inventories directly for both fast (1-MeV) and 14-MeV fission from U-235, U-238 and Pu-239 datasets recommended to the Defense Nuclear Agency (DNA) by Tal England of Los Alamos National Laboratory (LANL) (England, 1993a and England, 1993b). England was the reviewer for these inventories in the previously released ENDF/B-VI fission product dataset (Rose, 1991). He made the recommendation to use the updated inventories because he obtained better agreement with fission product gamma- and beta-emission measurements from very early to late times. This dataset was used extensively for other projects such as the Japanese A-Bomb dosimetry study. However, because it was a work in progress at LANL, it was not forwarded to the Brookhaven National Laboratory (BNL) National Nuclear Data Center for public access.

- 2) An option to include dose conversion factors from Federal Guidance Report 11 (FGR-11) (Eckerman, 1988) was added to supplement the tables of dose conversion factors used in the original version of FIIDOS, which are based on ORNL TM-190 (Killough, 1981) and ICRP-30 (ICRP, 1979).
- 3) A plutonium bioassay prediction capability was included.
- 4) An integrated exposure option was added to the original version's three discrete exposure options to assess internal doses in situations where the period of intake is long enough that significant changes occur in the radionuclide inventory; e.g., for an extended period on a residence island after an operation.

The code was rewritten in Fortran 77 and compiled for various computing platforms, including UNIX, Macintosh, and MS-DOS compatible systems. Runtimes on the various platforms ranged from 20 seconds up to 9 minutes, depending on the speed of the system and the compiler options specified.

# b. Data Changes

The original FIIDOS used data tables containing time-dependent radionuclide and gamma-ray spectral information for various fission radionuclides produced in a fast reactor that were generated in the original version of ORIGEN. FIIDOS interpolated between the standard times of the data tables to calculate the inventory and spectra at the times of interest. FIIDOS2 incorporated ORIGEN2, the latest available version of that code, as a callable subroutine, with modifications to support the NTPR Program needs. Thus, many of the original data tables were no longer necessary because the required information was passed directly from ORIGEN2 into FIIDOS via common block variables, which eliminated the interpolation steps. Additional modifications to ORIGEN2 included: 1) expanding the gamma-ray spectral data for many more isotopes

to provide accurate spectra at early times after detonation; 2) using the initial fission product inventories available in the fission product dataset obtained from LANL (England, 1993a and England, 1993b) for fission from U-235, U-238, and Pu-239; and 3) correcting for a few inconsistencies in the decay constants and gamma-ray spectra, which were found by comparing late-time decay inventory and spectra output from ORIGEN2-SAIC with that calculated by a LANL in-house code called CINDER10 (England, 1993a and England, 1993b). This modified version of ORIGEN2 was called ORIGEN2-SAIC (Roberts, 1996). For most scenarios using ORIGEN2-SAIC, the resulting organ doses produced by FIIDOS2 showed only minor differences from those generated by the original version of FIIDOS (generally less than one to two percent at exposures more than one hour after detonation).

# c. Dose Conversion Factors Added

The new dose conversion factors added into FIIDOS2 were taken from FGR-11, which utilized the ICRP-30 methods and models and expanded the inventory of dose conversion factors to 412 radionuclides. Additional large particle internal dose conversion factors for a particle size distribution of 10-micrometers (µm) activity median aerodynamic diameter (AMAD) were created using the computer code, DFINT (Eckerman, 1993). Inhalation dose conversion factors were selected for each nuclide according to the respiratory clearance class associated with the oxide form of each element. The addition of this data set had little, if any, impact on the internal organ doses reported by the NTPR Program because the organ doses resulting from ORNL TM-190 dose conversion factors tended to be greater than those from FGR-11. As directed by the Government for the NTPR program, the data set most favorable to the veterans continued to be the default choice.

# d. Plutonium Bioassay Added

A plutonium bioassay capability was added using the available radionuclide inventory data in FIIDOS to determine the total intake of Pu-239 based on the inhaled or ingested total number of curies (Ci) as calculated during the internal dose calculations. The Pu-239 excretion rate is represented by a five-term exponential function (Jones, 1985), which is used to predict the Pu-239 activity excreted in urine during any 24-hr period at specific times after uptake. While this modification had no effect on the resulting organ doses calculated by FIIDOS, it provided a tool to assess radiological uptake if a participant had a bioassay result greater than the population average during the period of the NTPR-sponsored Pu-239 bioassay program (1998-1999).

# **1.2.3 FIIDOS3**

Revisions to FIIDOS in 1999, called FIIDOS3 changed the program flow so that multiple discrete or integrated exposures with multiple measurements (all from the same detonation) could be handled in a single run. Previously, each measurement could have multiple exposure times associated with it, but only one measurement time could be used in a given run. This change enabled the user to include 50 measurement/exposure pairs

for discrete exposures (or any combination of measurements and exposures totaling 100), or 33 measurement/exposure pairs for integrated exposures. In addition, the plutonium bioassay capability was expanded to be more flexible by allowing the user to specify the number of excretion times to be evaluated and modifying the time of excretion to be specified relative to the detonation (instead of intake), which facilitates combining contributions from multiple or integrated exposures. Because of the substantial increase in computer power available at the time, even longer runs with a full input deck of 100 (measurement plus exposure) times usually took less than one minute on a personal computer. No other technical changes were made and the code output was verified to be consistent with the output from FIIDOS2.

# **1.2.4 FIIDOS4**

Three modifications have been made to FIIDOS since 1999. In 2001, options to include dose conversion factors for inhalation and ingestion from FGR-13 (EPA, 1999) were added to the code. The dose conversion factors presented in FGR-13 use the latest methods and models from the ICRP, including the ICRP-66 human respiratory tract model (HRTM) (ICRP, 1994a). Notably, these dose conversion factors provide the equivalent dose, which is the absorbed dose averaged over a tissue or organ and weighted by a radiation weighting factor ( $w_R$ ). Only one set of inhalation dose conversion factors for a particle size distribution of one-micrometer AMAD was incorporated into FIIDOS along with a new set of ingestion dose conversion factors. Because these dose conversion factors did not result in appreciable increases or decreases in the total reported organ doses for most participants relative to those calculated using the existing ICRP-30 or FGR-11 tables, the FGR-13 tables were only used in situations requiring a dose to an internal organ that was not contained in the other dose conversion factor tables.

In 2006, a second change allow the reporting of alpha-particle doses separately from beta particle and gamma-ray doses to accommodate the Department of Veterans Affairs' use of the Interactive RadioEpidemiological Program for calculating the probability of causation for cancers. This modification assumes that the alpha-particle dose to an organ equals the total organ dose for the alpha-particle emitting radionuclides in the FIIDOS inventory.

Also in 2006, a third change involved revision of the code in response to DTRA guidance to implement only the most current dose coefficients for determining internal dose. Namely, these were the dose coefficients based on ICRP-72 (ICRP, 1996). As part of this revision, options to use dose conversion factors previously included (ORNL TM-190, ICRP-30, FGR-11, and FGR-13) were removed from the code. However, records of their use in generating dose factor tables were retained for legacy purposes, and the revised code included the flexibility to accommodate dose coefficient data sets (including, if necessary, the old data sets) with up to 40 organs as input. The ICRP-72 dose conversion factors are based on the conceptual framework of ICRP-60 (ICRP, 1991) as implemented in the latest dosimetric and biokinetic models (ICRP, 1991; 1994a; 1994b; 1996). The ICRP-72 inhalation dose coefficients, as input to FIIDOS, were

selected to address concerns about particle size distribution. This set uses the dose coefficient for the particle size distribution that produces the highest dose to the organ of interest from among 1-, 3-, 5-, and 10-micrometer AMAD particle size distributions for the absorption type applicable to the oxide form of each constituent radionuclide. This set of "maximum dose" inhalation dose conversion factors supplants all previous sets for internal dose assessments.

The changes noted above outline the major differences between the original version of FIIDOS and the current version. Since FIIDOS2, no changes have been made that affect the methods used to calculate the doses; ensuing changes involve the dose conversion factors, program flow, options, and output presentation.

# 1.3 SUMMARY

The purpose of FIIDOS is to calculate the 50-year committed equivalent dose to various body organs and tissues resulting from the inhalation or the ingestion of fallout from nuclear weapons.

Figure 1 portrays the key features of FIIDOS. Four characteristics of FIIDOS enhance its applicability to radiation dose calculations associated with nuclear detonations:

- a) the production and radioactive decay of the radionuclides present in nuclear weapon fallout (including fission products, activation products, and actinide elements) is considered, permitting modifications to this radionuclide inventory to reflect detonationspecific analyses of activity fractions in the various isotopes of the nuclear debris;
- b) the dose calculation is based on a specific radiological measurement of the nuclear debris or fallout (such as a measurement of gross activity concentration or gamma-ray radiation intensity);
- c) calculated doses from both high linear energy transfer (LET) (alphaparticle) and low LET (beta-particle and gamma-ray) radiations support the calculation of probability of causation; and,
- d) the plutonium concentration in urine for times since detonation (corrected for time of uptake) is calculated.

Figure 2 illustrates, in a simplified manner, the logic used in FIIDOS to calculate committed organ doses. The computation can begin with any one of the nine types of radiological measurements listed in Figure 1 and indicated in Figure 2. The most common calculation scheme, based on a measurement of the radiation intensity above a contaminated surface, is described in the following sections.

The computation begins with the user-supplied radiation intensity, such as survey data in Roentgen per hour (R hr<sup>-1</sup>). FIIDOS calls the ORIGEN2-SAIC code to calculate a debris inventory and radiation intensity spectrum. After modifying the inventory and the gamma spectrum to reflect any post-detonation changes (e.g., the removal of the gases

krypton and xenon or fractionation effects), FIIDOS calculates the relationship between the radiation intensity and the surface activity concentration in Curies per square meter (Ci m<sup>-2</sup>). A user-supplied resuspension factor, which relates airborne contamination to surface contamination, converts the surface activity concentration to an airborne activity concentration (Ci m<sup>-3</sup>). Using this airborne activity concentration and user-supplied information on the exposure duration (hr) and the breathing rate (m<sup>3</sup> hr<sup>-1</sup>); FIIDOS determines the discreet activity for each radionuclide (Ci) present in the inhaled radioactive material. Based on the inventory of this radionuclide activity intake and a set of radionuclide-specific, inhalation dose conversion factors (in dose equivalent per material activity, i.e., rem  $\mu$ Ci<sup>-1</sup>) contained in FIIDOS, internal committed equivalent doses are calculated. Given the FIIDOS-calculated activity intake of Pu-239, a five-term exponential excretion function (Jones, 1985) is applied to calculate the Pu-239 activity concentration that is expected in 24-hour urine samples at specified times post-detonation.

As mentioned above and indicated in Figure 2, FIIDOS calculates factors that are used to convert the radiation intensity into an airborne or surface activity concentration and factors that are used to determine the activity of specific radionuclides in the ingested or inhaled radioactive material. Figure 3 illustrates the approach used in FIIDOS to calculate these factors.

As seen in Figure 3, the calculation of the factor used to convert radiation intensity to an airborne or surface activity concentration begins with the gamma-ray spectral data and the radionuclide inventory data for a reference amount (10<sup>14</sup> fissions) of radioactive material as calculated by ORIGEN2-SAIC. In response to user-supplied information on the weapon, the fallout, and the radiological measurement, the spectral and inventory data are modified to reflect the gamma-ray emission rate (γ hr<sup>-1</sup>) and the activity (Ci) of the reference amount of fallout material or nuclear debris at the time of the radiological measurement. Gamma-ray exposure factors are used to determine the radiation intensity (R hr<sup>-1</sup>) of the material present as airborne or surface contamination. The ratio of the radiation intensity to activity gives the factor used by FIIDOS to convert the measured radiation intensity to a calculated airborne activity concentration (R hr<sup>-1</sup> per Ci m<sup>-3</sup>) or surface activity concentration (R hr<sup>-1</sup> per Ci m<sup>-2</sup>). The activity derived from these factors is adjusted within FIIDOS for the actual time of exposure (depicted in Figure 2). The material given above provides an overview of the calculation scheme used in FIIDOS. A complete description of the technical approach used in FIIDOS is provided in Section 2.

FIIDOS can handle two types of basic dose calculation problems: single (acute) exposures and long duration (chronic) exposures. A single exposure problem involves a single radiological measurement and a single radiation exposure. This is a basic dose calculation handled by FIIDOS. Multiple exposures tied to single or multiple measurements may be entered with an equal or greater number of exposure times. A maximum of 100 entries, comprised of any combination of measurement and exposure times, may be entered for a single program execution. A long duration exposure problem

involves an exposure long enough that the debris inventory significantly changes, and thus the dose calculation requires time integration. As with single exposures, a long duration problem may include multiple measurements and an equal or greater number of exposures. A maximum of 33 measurement or exposure times is permitted for this type of problem.

Generally, the types of user-supplied input data required by FIIDOS are summarized in Table 1. The user input data are discussed in detail in subsequent sections of this report; Section 2 provides a technical discussion of the input data and Section 3 addresses the input data format requirements for the computer program.

### RADIONUCLIDES

- ORIGEN2-SAIC calculates decay inventory and spectra from 1600 isotopes of which the following subsets in FIIDOS.
  - o Fission Products 148 radionuclides from fast and 14-MeV neutron fission of U-235, U-238, and Pu-239.
  - o Activation Products 17 radionuclides.
  - o Actinide Elements 18 radionuclides.

# RADIOLOGICAL MEASUREMENTS

- Gross Ingestion Activity Intake (Ci).
- Gross Inhalation Activity Intake (Ci).
- Specific Ingestion Activity of Single Isotope as Part of Decayed Inventory (Ci).
- Specific Inhalation Activity of Single Isotope as Part of Decayed Inventory (Ci).
- Gross Airborne Activity Concentration (Ci m<sup>-3</sup>).
- Gross Surface Activity Concentration (Ci m<sup>-2</sup>).
- Radiation Intensity Aloft Inside Debris Cloud (R hr<sup>-1</sup>).
- Radiation Intensity at Surface Inside Debris Cloud (R hr<sup>-1</sup>).
- Radiation Intensity Above Contaminated Surface (intensity: R hr<sup>-1</sup>, tissue dose rate: rad hr<sup>-1</sup>, and film badge dose rate: rem hr<sup>-1</sup>).

### **ORGAN DOSES**

- 50-Year Committed Equivalent Dose.
  - o Ingestion or Inhalation (ICRP-72 data set).
  - O Up to 40 organs or tissues; currently 23 organs (adrenals, bone surface, brain, breast, stomach wall, small intestine wall, upper large intestine wall, lower large intestine wall, kidneys, liver, extrathoracic region, lung, muscle, ovaries, pancreas, red marrow, skin, spleen, testes, thymus, thyroid, uterus, urinary bladder wall) <u>plus</u> effective dose.
- Plutonium Excretion Functions for Urine (Jones, 1985)

Figure 1. Key features of computer code FIIDOS.

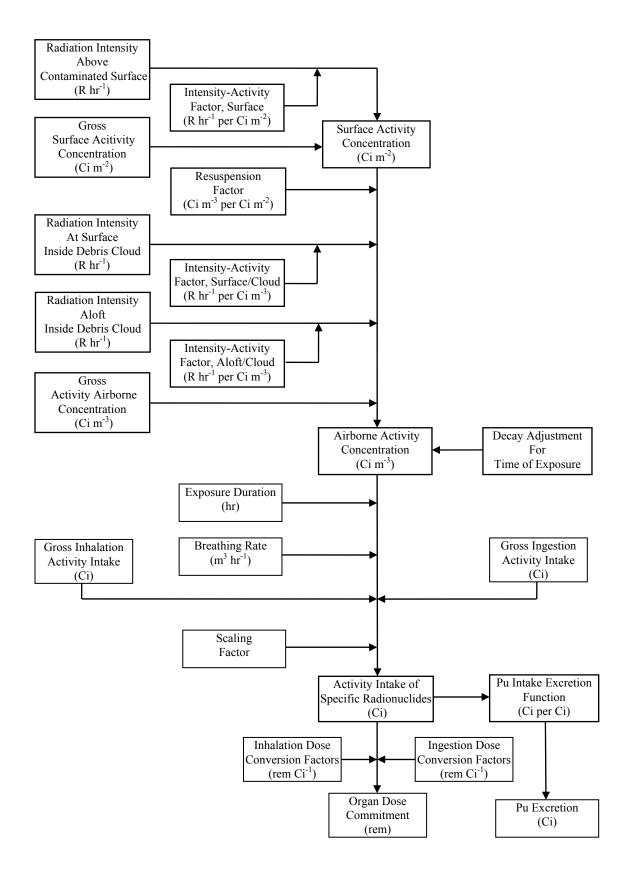


Figure 2. Schematic for calculation of organ dose.

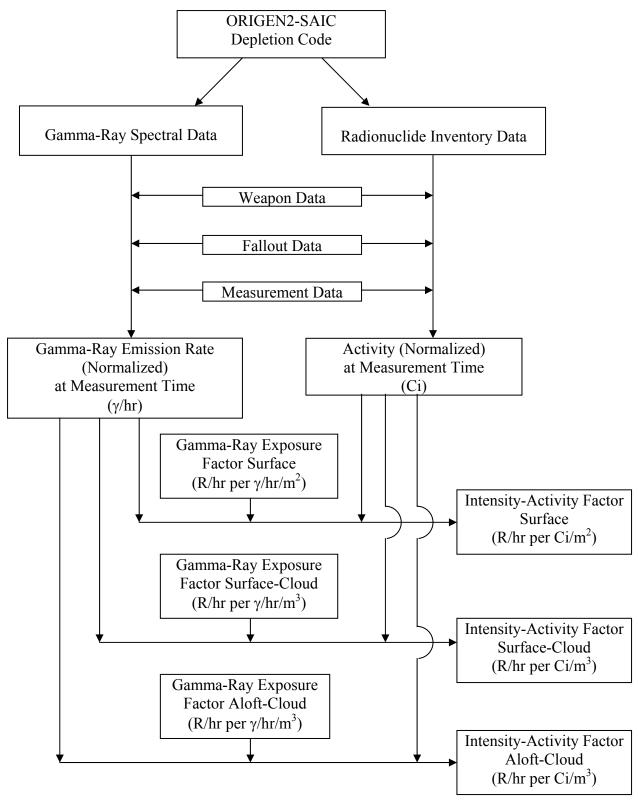


Figure 3. Schematic for calculation of intensity activity factors.

# Table 1. User-supplied input for FIIDOS.

# Problem Identification and Control Data

- Title of Problem
- Type of Problem
- Optional Output

# Radiological Measurement Data

- Type of Measurement
- Time of Measurement
- Measured Value
- Type of Measurement Device
- Supplemental Measurement Data

### **Dose Calculation Data**

- Number of Exposure Incidents
- Time of Exposure
- Duration of Exposure
- Breathing Rate
- Airborne Activity Surface Activity Ratio
- Type of Dose Conversion Factor

# Weapon Data

- Yield for Fissionable Material-Neutron Energy Sets
- Activation Product Production
- Actinide Element Production

# Fallout Data

- Krypton-Xenon Removal
- Fractionated Fission Product Identification
- Fractionated Fission Product Factor
- Fractionated Fission Product Spectrum

FIIDOS provides standard output and user-selected optional output. The standard output occurs automatically and provides a listing of the user-supplied problem input data and the basic dose results of a FIIDOS calculation. Three optional output modes can provide supplemental information on the details of a FIIDOS calculation. Section 3 provides a detailed description of the FIIDOS output.

The computer program FIIDOS consists of a main program and 18 subroutines in addition to the ORIGEN2-SAIC code and its subroutines. A data library consists of 19 files (17 read by FIIDOS and 2 read by the ORIGEN2-SAIC code) to provide capability to calculate a wide variety of problems. FORTRAN listings of the main program and subroutines are provided in Appendix B.

FIIDOS calls the ORIGEN2-SAIC code, which is a slightly modified version of the ORIGEN2 code with inventory and spectra databases prepared by Science Applications International Corporation (SAIC). The fast fission inventories were supplied by England (1993a and 1993b) of LANL. SAIC corrected several inconsistencies and transcription

errors in the gamma-ray production data (Roberts, 1996). The results have been benchmarked against measurements of gamma-ray spectra from fission products produced from fast neutrons for measurement times of seconds to days. Previously this kind of agreement had been difficult. The agreement is currently good to within a few percent. The fission product inventories from 14 MeV neutrons were also supplied by England.

Sample problems that illustrate the use of FIIDOS are given in Appendix C. They show FIIDOS's capability to use different types of radiological measurements for calculating doses to internal organs.

# **SECTION 2**

# TECHNICAL APPROACH

# 2.1 INTRODUCTION

The computer code FIIDOS calculates committed equivalent doses to various body organs that would result from the ingestion or inhalation of radioactive material produced by a nuclear detonation. These organ dose calculations are based on the amount of radioactive material ingested or inhaled, the radionuclide composition of the material, and organ dose conversion factors for each radionuclide.

A variety of options is available within FIIDOS either to specify or to calculate the amount of radioactive material taken into the body. When the mode of intake is ingestion, the amount of material must be specified as input to FIIDOS. When the mode of intake is inhalation, the amount of material may be specified as input to FIIDOS or may be determined by FIIDOS for selected exposure situations. These situations include exposure inside a nuclear debris cloud and exposure above a contaminated surface. For either situation, the level of contamination may be specified in terms of activity concentration or radiation intensity. The time at which the level of contamination is specified may precede, follow, or be coincident with the time at which the inhalation exposure occurs.

The radionuclide composition of the radioactive material is determined within FIIDOS by calling the ORIGEN2-SAIC code. It handles the production and decay of fission products, activation products, and actinides; it is time-dependent because of differential decay of the isotopic mix. FIIDOS uses data files with the fission product inventories for the fissioning of U-235, U-238, and Pu-239 by fast and 14-MeV neutrons; these files are read by ORIGEN2-SAIC. Provisions to modify the radionuclide composition to remove gaseous fission products and to reflect fission product fractionation effects are included in FIIDOS to be consistent with the original version. However, the ORIGEN2-SAIC code in FIIDOS could be used to allow additional fractionation by modifying the inventory at each time step of the calculations. This modification, if adopted, would allow for continuous fractionation adjustments. This is currently not done in FIIDOS because of the large uncertainties in the required input parameters and a systematic analysis of the impacts has not been performed. A fractionation report (Trabalka and Kocher, 2007) provides some bounding of the issue, but that is currently under peer review and an assessment of impact is needed before any implementation or adjustments to current procedures.

The current version represents a reconfiguration of the code to include only one set of dose coefficients (e.g., from ICRP-72) for inhalation and one set for ingestion and has the capacity to work with up to 40 organs to provide for future expansion. For current use in the NTPR Program FIIDOS uses two sets of dose conversion factors (also called dose

coefficients) to produce 50-year tissue or organ dose commitments from the ingestion and inhalation pathways. Conversion factors are tabulated for individual organs and effective dose for up to 148 fission products, 17 activation products, and 18 actinides. Organ dose conversion factors are available from ICRP-72 (currently 23 organs plus effective dose).

Previous releases of FIIDOS included up to 11 sets of internal dose conversion factors as user-selectable options. ORNL TM-190 contained factors for 148 fission product isotopes and ICRP-30 contained factors for 104 and 42 isotopes for small and large particles, respectively. A third optional set of internal dose conversion factors provided an expanded inventory of 412 nuclides that was also based upon methods and models of ICRP Publication 30.

A urinary excretion function calculation for Pu-239 is included as an option in FIIDOS. With this option, the activity of Pu-239 that is inhaled or ingested serves as input to an exponential excretion function (Jones, 1985) to predict the activity that is expected in 24-hour urine samples at specified times post-detonation. Where F(t) is the unitless fraction of initial uptake (e.g., to the bloodstream) found in 24-hour urine at time t (days) after uptake, the function is expressed as:

$$F(t) = 4.75 \times 10^{-3} (e^{-(0.558 t)}) + 2.39 \times 10^{-4} (e^{-(.0442 t)}) + 8.55 \times 10^{-5} (e^{-(0.0038 t)}) + 1.42 \times 10^{-5} (e^{-(0.0000284 t)}).$$
(2.1)

For intake I (Ci), the fraction of I that is absorbed into the bloodstream from the small intestine is given by an uptake fraction, fI, which is specific to the mode of intake. The following fI values from ICRP-30 are used:

for ingestion of Pu,

$$f1 = 1 \times 10^{-5}$$

and for inhalation of Pu,

$$fI = 5 \times 10^{-2}.$$

Then, the 24-hr urine activity U(t) (Ci) is given by:

$$U(t) = F(t) \times I \times f1. \tag{2.2}$$

Additional details concerning the technical approach adopted for FIIDOS are described in the following material. Section 2.2 presents the basic equations and parameters used for organ dose calculations and the specific procedures used in FIIDOS to determine the values of the parameters in the dose equations. A discussion of the limitations of the methodology and data used in FIIDOS is given in Section 2.3.

# 2.2 EQUATIONS AND PARAMETERS

The equation for determining the committed equivalent dose to organ j resulting from the intake of radionuclide i is:

$$D_{i,j} = A \times P_i \times DCF_i, \times 10^6 \tag{2.3}$$

Where:

 $D_{i,j}$  = committed equivalent dose (rem) to organ j due to intake of radionuclide i,

A =gross activity (Ci) of the radioactive material taken into the body by ingestion or inhalation,

 $P_i$  = activity fraction of radionuclide i in the material (Ci per Ci), and

 $DCF_{i,j} = 50$ -year organ dose conversion factor (rem  $\mu Ci^{-1}$ ) for the dose to organ j resulting from the intake of radionuclide i by ingestion or inhalation.

As mentioned in Section 2.1, a variety of options can be used to specify or determine the amount of radioactive material taken into the body. These options include:

- gross ingestion activity intake  $A_{ing}$  (Ci),
- gross inhalation activity intake  $A_{inh}$  (Ci),
- gross airborne activity concentration AC (Ci m<sup>-3</sup>),
- gross surface activity concentration SC (Ci m<sup>-2</sup>),
- radiation intensity aloft inside debris cloud  $I_{ca}$  (R hr<sup>-1</sup>),
- radiation intensity at surface inside debris cloud  $I_{cs}$  (R hr<sup>-1</sup>), and
- radiation intensity above contaminated surface  $I_s$  (R hr<sup>-1</sup>).

It should be noted that for the first option,  $A_{ing}$ , the mode of intake is ingestion; for the other options, the mode of intake is inhalation.

For those options in which the level of contamination is specified in terms of activity (Ci) or activity concentration (Ci m<sup>-3</sup> or Ci m<sup>-2</sup>), the amount of radioactive material taken into the body, A (Ci), is given by one of the following equations:

$$A = A_{ing} (2.4)$$

$$A = A_{inh} (2.5)$$

$$A = AC \times BR \times T \text{ or} \tag{2.6}$$

$$A = SC \times K \times BR \times T \tag{2.7}$$

Where:

BR = breathing rate (m<sup>3</sup> hr<sup>-1</sup>),

T = duration of exposure (hr), and

 $K = \text{resuspension factor (Ci m}^{-3} \text{ per Ci m}^{-2}, \text{ or m}^{-1}).$ 

For those options in which the level of contamination is specified in terms of radiation intensity ( $R \, hr^{-1}$ ), the amount of radioactive material taken into the body, A (Ci), is given by one of the following equations:

$$A = [I_{ca} \times (\sum_{E} S \times \psi_{ca})^{-1}] \times BR \times T$$
 (2.8)

$$A = [I_{cs} \times (\sum_{E} S \times \psi_{cs})^{-1}] \times BR \times T, \text{ or}$$
 (2.9)

$$A = [I_s \times (\sum_E S \times \psi_s)^{-1}] \times BR \times T$$
 (2.10)

Where:

 $S = \text{emission rate of gamma rays of energy } E \text{ from the radioactive material } (\gamma \text{ hr}^{-1} \text{ per Ci}),$ 

 $\psi_{ca}$  = energy dependent factor relating radiation intensity aloft inside debris cloud to gamma ray emission rate density (R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup>m<sup>-3</sup>),

 $\psi_{cs}$  = energy dependent factor relating radiation intensity at surface inside debris cloud to gamma ray emission rate density (R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup>m<sup>-3</sup>), and

 $\psi_s$  = energy dependent factor relating radiation intensity above contaminated surface to gamma ray emission rate surface density (R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup>m<sup>-2</sup>).

The bracketed expression in Equations 2.8 and 2.9 provide the basis for translating radiation intensity (R hr<sup>-1</sup>) into an equivalent gross airborne activity concentration

(Ci m<sup>-3</sup>); similarly, the bracketed expression in Equation 2.10 yields an equivalent gross surface activity concentration (Ci m<sup>-2</sup>).

These equations can be used to calculate the committed organ dose resulting from the ingestion or inhalation of a specific radionuclide. However, a set of equations that is more closely related to the type of input data available to FIIDOS will be developed by replacing the activity fraction parameter (i.e.,  $P_i$  in Equation 2.3) and the gamma-ray emission rate parameter (i.e., S in Equations 2.8, 2.9, and 2.10) with more basic parameters.

As previously discussed, FIIDOS uses radionuclide inventory data and gamma-ray spectral data calculated by the computer code ORIGEN2-SAIC. The basis for these ORIGEN2-SAIC calculations is the number of fissions specified to have occurred in a fuel material (e.g., U-235). The radionuclide inventory data and the gamma-ray spectral data calculated for FIIDOS are based on 10<sup>14</sup> fissions in a fuel material with the corresponding normalized activities of actinides and activation products. This fission input value for the ORIGEN2-SAIC calculations is somewhat arbitrary, but was selected to avoid computer arithmetic limits that could occur if very low values or very high values had been used. Accordingly, the parameters taken directly from the ORIGEN2-SAIC run are:

 $A_i$  = activity of radionuclide *i* resulting from  $10^{14}$  fissions (Ci per  $10^{14}$  fissions),

 $A_T$  = total activity resulting from 10<sup>14</sup> fissions (Ci per 10<sup>14</sup> fissions), and

 $S_T$  = rate of emission of gamma rays of energy E from the radioactive material produced by  $10^{14}$  fissions ( $\gamma$  hr<sup>-1</sup> per  $10^{14}$  fissions).

The relationships between the above parameters and the parameters  $P_i$  and S are:

$$P_i = A_i \times (A_T)^{-1} \text{ and} \tag{2.11}$$

$$S = S_T \times (A_T)^{-1} \tag{2.12}$$

A set of dose calculation equations, with each equation applicable to a specific material intake option, is constructed by successively substituting Equations 2.4 through 2.10 into Equation 2.3 and using Equations 2.11 and 2.12 to eliminate the parameters  $P_i$  and S. The resulting equations are:

$$D_{i,j} = DCF_{i,j} \times A_i \times A_{ing} \times (A_T)^{-1} \times 10^6$$
(2.13)

$$D_{i,j} = T \times BR \times DCF_{i,j} \times A_i \times AC \times (A_T)^{-1} \times 10^6$$
(2.15)

$$D_{i,j} = T \times BR \times K \times DCF_{i,j} \times A_i \times SC \times (A_T)^{-1} \times 10^6$$
(2.16)

$$D_{i,j} = T \times BR \times DCF_{i,j} \times A_i \times I_{ca} \times (\sum_{E} S_T \times \psi_{ca})^{-1} \times 10^6$$
(2.17)

$$D_{i,j} = T \times BR \times DCF_{i,j} \times A_i \times I_{cs} \times (\sum_{E} S_T \times \psi_{cs})^{-1} \times 10^6$$
(2.18)

$$D_{i,j} = T \times BR \times K \times DCF_{i,j} \times A_i \times I_s \times (\sum_{E} S_T \times \psi_s)^{-1} \times 10^6$$
(2.19)

The structure of the above set of equations suggests that a general dose calculation equation be defined as:

$$D_{i,j} = T \times BR \times K \times DCF_{i,j} \times A_i \times SF \times 10^6$$
(2.20)

Where:

T, BR, and K are set equal to dimensionless unity if the gross ingestion intake (AC in Equation 2.13), or the gross inhalation intake ( $A_{inh}$  in Equation 2.14) is specified, K is set equal to dimensionless unity if the gross airborne activity concentration (AC in Equation 2.15), the radiation intensity aloft inside a debris cloud ( $I_{ca}$  in Equation 2.17), or the radiation intensity at the surface inside a debris cloud ( $I_{cs}$  in Equation 2.18) is specified, and SF is given by one of the following equations:

$$SF = A_{ing} \times (A_T)^{-1} \tag{2.21}$$

$$SF = A_{inh} \times (A_T)^{-1} \tag{2.22}$$

$$SF = AC \times (A_T)^{-1} \tag{2.23}$$

$$SF = SC \times (A_T)^{-1} \tag{2.24}$$

$$SF = I_{ca} \times (\sum_{E} S_T \times \psi_{ca})^{-1}$$
 (2.25)

$$SF = I_{cs} \times (\sum_{E} S_T \times \psi_{cs})^{-1}$$
 (2.26)

$$SF = I_s \times (\sum_E S_T \times \psi_s)^{-1}$$
 (2.27)

Note that in Equation 2.20 the committed equivalent dose is calculated with the restriction that all parameters remain constant during the period of exposure. If the conditions of exposure change or there is significant decay, the period of exposure should be subdivided into smaller intervals. Apply Equation 2.20 successively to each interval with the results summed to give the committed equivalent dose for the total period. The long duration option available in FIIDOS should be utilized for this type of "time-

dependent" dose calculation.

The following sections provide descriptions of the six parameters in Equation 2.20. Three of the parameters (i.e., T, BR, and K) are user-supplied input to FIIDOS; guidance is provided regarding the selection of values for the parameters. The parameter  $DCF_{i,j}$  is contained within FIIDOS as sets of ingestion and inhalation dose conversion factors; the basis for these factors is discussed. The parameters  $A_i$  and SF are calculated within FIIDOS; the procedures used to calculate these parameters and the required user-input for the calculations are discussed.

# 2.2.1 Duration of Exposure

The duration of exposure T (hr), is the amount of time the individual is exposed to the inhalation source. If the gross ingestion or inhalation activity intake is specified, the parameter T should be set to one (1.0). The duration of exposure is a user-supplied input to FIIDOS.

# 2.2.2 Breathing Rate

The breathing rate, BR (m<sup>3</sup> hr<sup>-1</sup>), is a user-supplied input. If the gross ingestion or inhalation activity intake is specified, the parameter BR should be set to one (1.0). Since the breathing rate is dependent upon the physical activity of the individual during his exposure, the following material assists the FIIDOS user in selecting the appropriate breathing rate.

The breathing rate for a typical adult male is specified in ICRP (1975) Publication 23 and NCRP (1997) Report No. 125 as 1.2 m<sup>3</sup> hr<sup>-1</sup> for light activity. According to Bates (1966), this value is the approximate breathing rate during walking on a flat surface at a speed of about three miles per hour.

Higher breathing rates would result from more physically demanding activities. Based on the material according to Bates (1966) and ICRP (1975) Publication 23, and NCRP (1997) Report No. 125, breathing rates of 1.5 m<sup>3</sup> hr<sup>-1</sup> for moderate activity and 2.0 m<sup>3</sup> hr<sup>-1</sup> for heavy activity appear reasonable. Correspondingly, lower breathing rates would result from less physically demanding activities. The breathing rate cited in ICRP (1975) Publication 23 for resting is 0.45 m<sup>3</sup> hr<sup>-1</sup>. That cited in NCRP (1997) Report No. 125 for low activity is 0.6 m<sup>3</sup> hr<sup>-1</sup>, where low activity is defined as approximately 30 percent above basal with respect to minute volume.

# 2.2.3 Airborne Activity-Surface Activity Ratio

The parameter K (m<sup>-1</sup>) is the ratio of the airborne activity (Ci m<sup>-3</sup>) to the surface activity (Ci m<sup>-2</sup>). This parameter is needed for a dose calculation if information on the airborne contamination is not directly available but rather must be inferred from information on the surface contamination. For example, a post-shot radiation survey of an area contaminated with fallout that measures the radiation intensity (R hr<sup>-1</sup>) of the deposited fallout provides information on the surface contamination, not airborne contamination.

The airborne activity-surface activity ratio used in the dose calculation equation should be the ratio that is appropriate for the time at which the inhalation exposure occurred. If the duration of the exposure is long, it may be necessary to subdivide the period of exposure into smaller intervals and use different values of the ratio for each interval. Such a situation could occur if the phenomena or mechanisms that relate airborne activity and surface activity change during the exposure period.

In the FIIDOS methodology, the parameter K is a user-supplied input and no default values are provided. The following material introduces approaches that can be used to develop estimates of the airborne activity-surface activity ratio. Section 2.2.3.1 addresses the relationship between airborne activity and surface activity that would occur during the passage of a fallout-depositing, aerosol cloud. Section 2.2.3.2 addresses the relationship between the airborne activity and surface activity that would occur due to the resuspension of previously deposited material by natural or other sources.

# 2.2.3.1 Deposition from Aerosol Cloud

An aerosol cloud with an airborne activity concentration AC (Ci m<sup>-3</sup>) deposits fallout material during its passage. The surface activity concentration, SC (Ci m<sup>-2</sup>), produced by the passing cloud is:

$$SC = \int_t AC \times V \times dt$$
 (2.28)

Where

 $V \text{ (m sec}^{-1}) = \text{the rate at which material falls from the cloud.}$ 

Assuming that AC and V are independent of time, the surface activity concentration resulting from the cloud for a deposition period of T (sec) is:

$$SC = AC \times V \times T \tag{2.29}$$

Thus, the ratio of the airborne activity to the surface activity,  $K(m^{-1})$ , is:

$$K = (V \times T)^{-1} \tag{2.30}$$

In the above equation, the fall velocity V (m sec<sup>-1</sup>) is a single-valued parameter. V could

be either a nominal value or an average value. An average value could be calculated if information on the distribution of activity as a function of particle size were available. Where particle size data are unavailable, V can be obtained from the nuclear cloud stabilization height and time after burst.

As an illustration, consider an exposure scenario involving a high-yield nuclear detonation. The time-period during which fallout deposition occurred at the location of interest was 10 hours. The fallout particles had a measured diameter of 60  $\mu$ m and a density of 2 g cm<sup>-3</sup>, giving a fall velocity of 0.2 m sec<sup>-1</sup>. For these values of V and T, the value of K is  $1.4 \times 10^{-4}$  m<sup>-1</sup>.

# 2.2.3.2 Resuspension of Deposited Material

Resuspension refers to a process in which previously deposited radioactive particles are removed from the surface to form an airborne aerosol. In literature on resuspension, the ratio of the airborne activity (Ci m<sup>-3</sup>) to the surface activity (Ci m<sup>-2</sup>) is characterized by a resuspension factor (m<sup>-1</sup>). The resuspension factor is a form of the parameter K used in the FIIDOS methodology when the exposure scenario involves resuspension.

The concept of a resuspension factor is best suited to situations having spatial independence in both airborne activity and surface activity. Nevertheless, resuspension factors have been reported for many situations involving disturbances to the surface of limited area extent. A good introduction to resuspension factors is provided in the Reactor Safety Study (USNRC, 1975). Table 2 shows the results of the literature survey cited in the study and lists the references.

Resuspension is a rather complicated process, and the principles governing the process are not well understood. However, resuspension factors have been determined experimentally for several conditions. These results show that the resuspension factor depends on the activity causing resuspension, the characteristics of the surface, and the characteristics of the deposited particles. In addition, the resuspension factor is time-dependent, is affected by the wind velocity, and is dependent upon the height above the surface. Unfortunately, the data on resuspension processes are not adequate to permit the development of a general model of resuspension that incorporates all observed effects.

Natural resuspension refers to the wind-driven resuspension that occurs in the absence of any extraordinary activity that could cause resuspension. Models of natural resuspension are based on the resuspension of nuclear detonation fallout or dispersed plutonium in desert environments, because most of the available resuspension data have been taken from such situations. Since the resuspension factor decreases with time, the natural resuspension value includes a time dependent resuspension factor.

For natural resuspension, the Reactor Safety Study proposed a time dependent resuspension factor of the following form:

$$K(t) = K_0 \times e^{-(\lambda t)} + K_e \tag{2.31}$$

The initial resuspension factor ( $K_0$ ) is given a value of  $10^{-5}$  m<sup>-1</sup>; this value is termed a "reasonable estimate" and generally corresponds to the values cited for natural, wind-driven resuspension factors. The equilibrium resuspension factor ( $K_e$ ) is given a value of  $10^{-9}$  m<sup>-1</sup>; this value is based on measurements of the resuspension factor in aged ( $\sim$ 17 years) fallout fields and contaminated areas. The decay constant ( $\lambda$ ) is given a value of 0.677 y<sup>-1</sup>; which reflects a half-life ( $T_{1/2}$ = (ln 2) ×  $\lambda$ <sup>-1</sup>) of 0.977 yr; this half-life is based on assuming that the resuspension factor decreases exponentially from  $10^{-5}$  m<sup>-1</sup> to  $10^{-9}$  m<sup>-1</sup> in 17 years.

The Reactor Safety Study resuspension factor model is "calibrated" to the long-term behavior of the resuspension factor and might not correctly portray the short-term behavior. A model which is "calibrated" to both the short-and long-term behavior of the resuspension factor was suggested by Anspaugh (1975). This model has the following form:

$$K(t) = K_0 \times e^{-(\lambda \times [SQRT\{t\}])} + K_e$$
 (2.32)

In this model, the initial resuspension factor ( $K_0$ ) is given a value of  $10^{-4}$  m<sup>-1</sup>; this value has been termed "conservative", and appears to encompass both natural resuspension and artificial or man-made resuspension. As with the Reactor Safety Study model, the equilibrium resuspension factor ( $K_e$ ) is given a value of  $10^{-9}$  m<sup>-1</sup>. The decay constant ( $\lambda$ ) is given a value of 0.15 in units of days<sup>-1/2</sup>. This value, along with the exp ( $-\lambda \times t^{1/2}$ ) expression, is intended to cause the resuspension factor to exhibit: a half-life of 5 weeks during the first 10 weeks after the initial deposition, a half-life of about 10 weeks during the next 30 weeks, and an equilibrium value after 17 years.

A comparison of the Anspaugh and the Reactor Safety Study resuspension models is given in Figure 4. The initial order-of-magnitude difference between the two resuspension factor expressions disappears rapidly and the difference between the two factors is at most a factor of two after one year.

Wind speed also affects the resuspension factor. The effect of the wind speed is strongly dependent upon the characteristics of the deposited particles and the surface material. In addition, as time passes and the deposited particles become more intimately mixed with the surface material, the effect of the wind speed is likely to be lessened. Because of these complications, various wind speed relationships are reported in the resuspension factor literature; for example, Stewart (1964) reports cases where no relationship between airborne concentration and wind speed was observed and cases where the value of the resuspension factor varied approximately as the wind speed cubed.

Table 2. Resuspension factors reported in reactor safety study.

<u>Arid/Desert</u>		
4x10 <sup>-7</sup>	near road graded in fallout field (a)	
3x10 <sup>-5</sup>	in Land Rover during travel to work site and outside during work; fission products (5-18 hr) <sup>(a)</sup>	
3 to 10x10 <sup>-4</sup>	downwind of crater (a)	
1x10 <sup>-3</sup>	mechanical disturbances (a) for UO <sub>2</sub>	
5x10 <sup>-4</sup>	dust from vehicles	
10 <sup>-4</sup> to 10 <sup>-6</sup>	dust from pedestrians (a) for PuO <sub>2</sub>	
3x10 <sup>-7</sup>	particles of 7 µm MMD on 6-m circles (sandy) furrowed and rocky with sand base (dry) (b)	
1x10 <sup>-7</sup> to 3x10 <sup>-</sup>	·7 (wet) <sup>(b)</sup>	
1.2x10 <sup>-7</sup>	in 1000 μg/m² isopleth	
1.4x10 <sup>-7</sup>	in 100 $\mu$ g/m <sup>2</sup> isopleth PuO <sub>2</sub> Safety Test (c)	
1.6x10 <sup>-6</sup>	in 10 μg/m <sup>2</sup> isopleth	
~35 day half-tii	me air concentration decay 1 to 3 μm median aerosol size	
38 day half-tim	ne for resuspension of fission products of Schooner <sup>(d)</sup>	
76 day half-tim	ne for resuspension of fission products from Baneberry (d)	
3x10 <sup>-10</sup>	for 8- to 10- year Pu aged deposit (e)	
2x10 <sup>-9</sup>	for direction of strongest wind (e)	

	Semiarid/Grassland
5x10 <sup>-6</sup>	(ZnS) walking and loading boxes (f)
1x10 <sup>-5</sup>	(±.5x10 <sup>-5</sup> )limestone, rock, sand, grass, bushes; fission products <sup>(a)</sup>
.8 to 2x10 <sup>-7</sup>	crater of tower shot; fission products; road graded from soil disturbance (a)
2x10 <sup>-5</sup> to 4x10 <sup>-6</sup>	in vehicle on road graded through fallout
8x10 <sup>-6</sup>	0 to 4 μm U <sub>3</sub> O <sub>8</sub> undisturbed
5x10 <sup>-7</sup>	0 to 4 $\mu$ m U <sub>3</sub> O <sub>8</sub> undisturbed sandy soil with desert grasses (a)
8x10 <sup>-9</sup> to 10 <sup>-11</sup>	Y-91 aqueous solution on sandy soil-rain weathering small plot <sup>(a)</sup>
1x10 <sup>-7</sup>	for particles of 7 $\mu m$ MMD on 6-m circle grass plot (dry) $^{(b)}$
4x10 <sup>-8</sup>	for particles of 7 µm MMD on 6-m circles grass plot protected by snow fence (dry) (t
2x10 <sup>-7</sup>	both cases, above, wet (b)

<u>Urban/Suburban</u>		
2.5x10 <sup>-6</sup>	sandblasting for I-131 removal (g)	
2x10 <sup>-6</sup>	0 to 4 $\mu m~U_3O_8$ particles on concrete slabs <sup>(a)</sup>	
1.5x10 <sup>-7</sup>	0 to 12 $\mu$ m $U_3O_8$ particles on concrete $^{(a)}$	
10 <sup>-4</sup> to 10 <sup>-2</sup>	fraction resuspended per pass through particles <sup>(h)</sup>	
2x10 <sup>-2</sup> to 2x10 <sup>-4</sup> initially very rapid half-time of a few days		
~2x10 <sup>-5</sup> to 2x10 <sup>-3</sup> at 4 days		

<u>Interiors</u>		
1x10 <sup>-5</sup>	heavy work $^{(i)}$ ZnS (3.1 $\mu$ m)	
7x10 <sup>-4</sup>	light work $^{(i)}$ CuO (2 $\mu$ m)	
2x10 <sup>-3</sup>	operations (j)	
.4 to 7x10 <sup>-3</sup>	clothes change and other activity (k)	
1.2x10 <sup>-4</sup>	people walking in change room (k)	
5x10 <sup>-5</sup>	PuO <sub>2</sub> , many steps <sup>(1)</sup>	
3x10 <sup>-6</sup>	PuNO <sub>3</sub> , many steps <sup>(1)</sup>	
2x10 <sup>-4</sup> to 4x10 <sup>-4</sup>	5 in enclosed space I-131 in brick dust (a,g)	

# Table 2. Resuspension factors reported in reactor safety study (Concluded)

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- (g) Chamberlain, A. C., Chadwick, R. C. 1965. "Transport of Iodine from Atmosphere to Ground." Harwell, Berkshire: United Kingdom Atomic Energy Authority Report AERE-R 4870.
- (h) Anspaugh, L. R., Shinn, J. H., Wilson, D. W. 1974. "Evaluation of the Resuspension Pathway Towards Protective Guidelines for Soil Contamination with Radioactivity," in Proc. IAEA/WHO Symp. on Radiological Safety Evaluation of Population Doses and Application of Radiological Safety Standards to Man and the Environment, Portoroz, Yugoslavia, May 20-24, 1974.
- (i) Fish, B. R., et al. 1965. "Redispersion of Settled Particulates." Oak Ridge, TN: Oak Ridge National Laboratory. Report ORNL-TM-1049.
- (j) Bailey, J. C., Rohr, R. C. 1953. "Air-Borne Contamination Resulting from Transferable Contamination on Surfaces." Oak Ridge, TN: Union Carbide Nuclear Company, Oak Gaseous Diffusion Plant. Report K-1088.
- (k) Brunskill. 1964. "The Relationship Between Surface and Airborne Contamination." in Proc. Symp. Surface Gatlinburg, Tenn. Oxford, U.K.: Pergamon Press.
- (1) Jones, I. S., Pond, S. F. 1964. "Some Experiments to Determine the Resuspension Factor of Plutonium Various Surfaces." in Proc. Symp. Surface Contamination, Gatlinburg, Tenn. Oxford, U.K.: Pergamon Press.

Resuspension factor modeling by Anspaugh (1975) is most applicable to the resuspension of material in a desert environment. Based on soil erosion studies conducted at the Nevada Test Site, Anspaugh modeling suggests that the resuspension factor is proportional to the wind speed squared. The comparison between the model and experimental measurements showed good agreement.

The resuspension factor is also dependent on the height above the surface at which the air concentration is measured. However, this effect is likely to be dependent on the characteristics of the deposited particles and the surface material. Not surprisingly, various height effects are reported in the resuspension factor literature. Stewart (1964) observed that the resuspension factor decreased by a factor of three as the height was increased from 1 to 2 feet above the surface. However, Anspaugh's (1975) modeling indicates that the resuspension factor varies by only 20 percent over a height range of 0.5 to 2 meters. The existing models of natural resuspension are very simplistic. Estimated resuspension factors should be considered order-of-magnitude estimates. Rather than estimating specific resuspension factors, it might be more appropriate to provide an upper-bound estimate of a resuspension factor.

Man-made resuspension refers to the resuspension caused by human activity such as pedestrian and vehicular traffic. Some of the resuspension factor values cited in Table 2 reflect man-made resuspension. The values range from  $10^{-4}$  m<sup>-1</sup> to  $10^{-6}$  m<sup>-1</sup> for pedestrian-promoted resuspension, and from  $2 \times 10^{-5}$  m<sup>-1</sup> to  $4 \times 10^{-6}$  m<sup>-1</sup> for resuspension caused by vehicular traffic; however, because derivation of these data are taken from different experiments, direct comparisons should not be made.

No models of man-made resuspension are proposed. Estimates of resuspension factors should be based on the experimental data that most adequately characterize the situation of interest.

# 2.2.4 Dose Coefficients

The dose coefficients,  $DCF_{i,j}$  (rem  $\mu$ Ci<sup>-1</sup>), used in the most recent version of FIIDOS provide 50-year equivalent dose commitments to organ j per unit intake of radionuclide i and are based on the concepts in ICRP-60 and the models described in ICRP Publications 66, 68, and 72. As discussed in Section 1.2.4, the ICRP-72 inhalation dose coefficients provide a maximum dose commitment for intakes of aerosols of 1-, 3-, 5-, or 10-micrometer AMAD. Figure 1 lists the 23 organs and tissues for which ICRP-72 dose coefficients are provided in FIIDOS. The ICRP-72 dose coefficients represent a significant departure from those based on ICRP-30 and earlier publications in several respects, as outlined below (Leggett, 2003).

# Dosimetric Quantities

ICRP-60 introduces a new dosimetric quantity, the equivalent dose  $(H_T)$ , which is the absorbed dose (energy absorbed per unit mass) <u>averaged over a tissue or organ</u> and weighted by the radiation quality that is of interest. The weighting factor is the radiation weighting factor  $(w_R)$  and is selected for the type and energy of the radiation incident on the body, or, in the case of sources within the body, emitted by the source. In ICRP-30, the weighting factor was applied to the absorbed dose at a point and called the quality factor (Q). The weighted absorbed dose was called the dose equivalent (H).

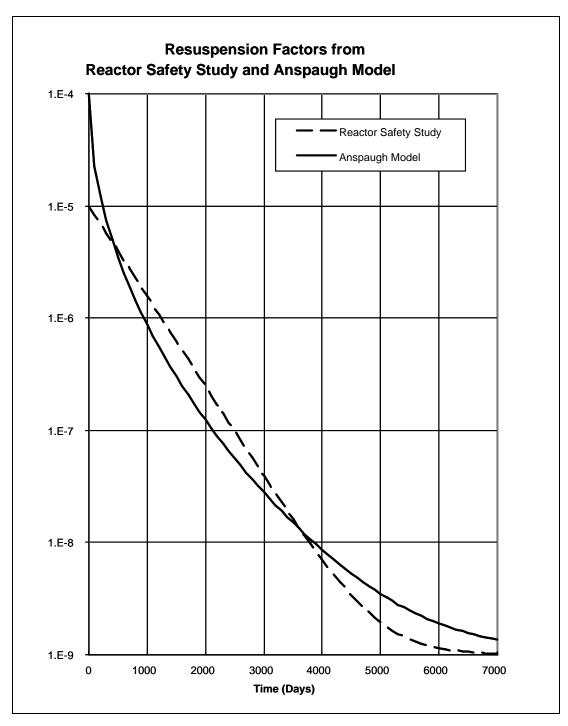


Figure 4. Comparison of time-dependent resuspension models.

Subsidiary dosimetric quantity: The committed equivalent dose,  $H_T(\tau)$ , is the time integral of the equivalent dose rate, where  $\tau$  is the integration time in years following the intake. When  $\tau$  is not specified, the implied value for adults is 50 years.

Under ICRP-60, the effective dose (E) is the equivalent dose weighted by the tissue weighting factor, which represents the relative contribution of that organ or tissue to the total detriment due to stochastic effects resulting from uniform irradiation of the whole body. The effective dose replaces effective dose equivalent in ICRP-26 and -30. ICRP-60 provides a modified and expanded set of tissue weighting factors as compared to ICRP-30. In most cases, effective dose conversion factors are relatively insensitive to changes in the tissue weighting factors.

Subsidiary dosimetric quantity: The committed effective dose,  $E(\tau)$ , is the time integral of the effective dose rate, where  $\tau$  is the integration time in years following the intake. When  $\tau$  is not specified, the implied value for adults is 50 years.

# Respiratory Tract Model

The updated human respiratory tract model (ICRP-66) addresses age, gender, breathing rate, and other factors (particle sizes) in total and regional deposition of inhaled material in the respiratory tract. For a reference adult male, the ICRP-66 model predicts lower total deposition in the respiratory tract and lower deposition in the lower lungs than does the Task Group Lung Model (TGLM) used in ICRP-30 for most particle sizes.

The ICRP-66 model predicts much different rates of absorption from the respiratory tract to blood. The updated model addresses the heterogeneous distribution of radiosensitive cells within the respiratory tract. In contrast, the TGLM assumes that the total activity in the lungs is uniformly distributed in the total blood-filled lungs with a mass of 1000 g. The differences in the biokinetic and dosimetric properties of the updated ICRP-66 model and the TGLM lead to substantially different estimates of lung dose in many cases.

# Gastrointestinal Absorption Fractions (f1)

For the reference, adult male, substantial changes in fI values have been made for some forms of cobalt, tellurium, lanthanides, and actinide elements, including uranium. Doses to systemic tissues change nearly in proportion to fI in most cases (except when doses to tissues result mainly from penetrating radiations originating in the intestinal contents). Some systemic models used in ICRP-68 feature feedback from systemic tissues back to gastrointestinal contents.

# Systemic Biokinetic Models

The updated models provide age-specific biokinetics for 31 elements. The models for some elements are more detailed and physiologically realistic than the corresponding models in ICRP-30.

In ICRP-30, decay chain members produced in the body generally were assigned the biokinetic model of the parent radionuclide; this is referred to as "shared kinetics" of

decay chains. The updated models retain "shared kinetics" for many decay chains. If the parent is an isotope of lead, radium, thorium, or uranium, then a radionuclide (other than a noble gas) formed either in soft tissue or on bone surfaces is assumed to have "independent kinetics," and a radionuclide formed in the bone volume is assigned the biokinetics of the parent.

Comparisons were made between maximum dose ICRP-72 inhalation DCFs with ICRP-30 based factors (1- and 20-micrometer AMAD aerosols) and ICRP-72 with ICRP-30 for ingestion (all in rem per curie intake) for a five organs of interest. A representative high-yield oceanic shot was selected (CASTLE BRAVO). Times after detonation range from H+1 to H+8760 hours. Comparisons are depicted in Figures 5 through 7.

The two sets of ingestion and inhalation dose conversion factors used in FIIDOS for current dose calculations are given in Appendix A, Tables A-1 and A-2.

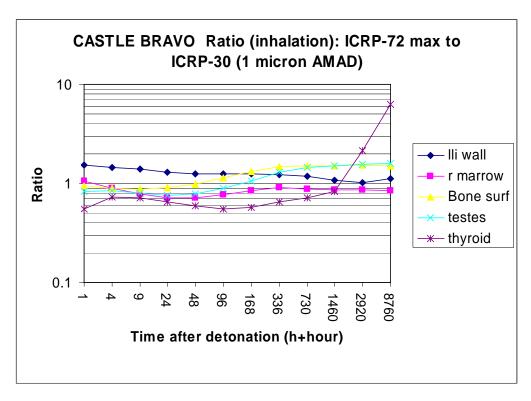


Figure 5. The ratio of the ICRP-72 maximum organ dose to the ICRP-30 organ dose from inhalation of 1-micrometer AMAD particles for selected organs.

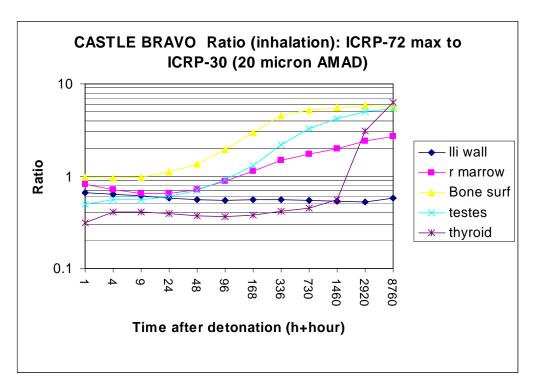


Figure 6. The ratio of the ICRP-72 maximum organ dose to the ICRP-30 organ dose from inhalation of 20-micrometer AMAD particles for selected organs.

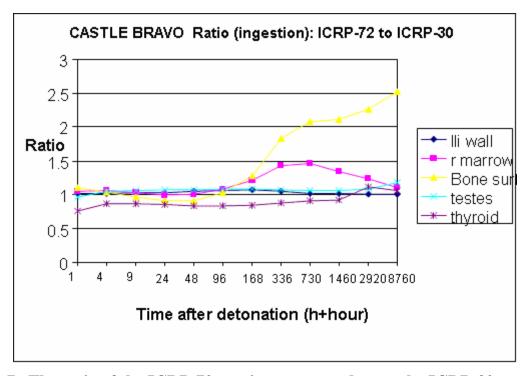


Figure 7. The ratio of the ICRP-72 maximum organ dose to the ICRP-30 organ dose from ingestion for selected organs.

Tables A-1 and A-2 provide the ingestion and inhalation dose conversion factors from ICRP-72 (ICRP, 1996) which are based on ICRP-60 and the lung and systemic biokinetic models based thereon (ICRP, 1991; 1994a; 1994b).

## 2.2.5 Relative Radionuclide Inventory

The relative radionuclide inventory is the amount of each radionuclide (Ci) present in a model sample of nuclear debris or fallout (based on  $10^{14}$  fissions) at a specified time. This inventory includes fission products, activation products, and actinide elements. The inventory appears in the dose calculation equation, Equation 2.20, as the parameter  $A_i$ .

The relative radionuclide inventory is calculated in the ORIGEN2-SAIC code. The initial inventory is constructed based on user-supplied data on fission yield, activation product production, and actinide element production. After decay, the inventory can be modified by removing gaseous fission products and by adjusting specific radionuclide concentrations to reflect fission product fractionation effects. The techniques used to construct and to modify the relative radionuclide inventory are described below.

#### Fission Products

FIIDOS obtains a decayed fission product inventory by a mixing of initial fission products from U-235, U-238, and Pu-239 by fast or 14-MeV neutrons. The mixture of the initial six inventories is decayed by the isotope generation and depletion code ORIGEN2-SAIC. The inventories are based on  $10^{14}$  fissions with an instantaneous (i.e., 1 msec) irradiation time to avoid computer underflow problems. This code is a slightly modified version of the ORIGEN2 code with modifications made by SAIC to use fission product data provided by England (1993a and 1993b), and ENDF/B-VI decay and gamma-ray spectral information. Information for actinides and activation products is provided as user input to the ORIGEN2-SAIC code. Nearly 1600 isotopes are calculated, i.e. 688, 129, and 781 activation products, actinides, and fission products, respectively. The decay of this mixed inventory is calculated through 40 standard decay times. These standard decay times range from 0.001 seconds to 317 years in three time steps per decade. The decay inventory and spectra at any specific time of interest are calculated by one additional decay from the nearest standard decay time. When the inventory output is requested the activity of 148 fission product radionuclides are listed (see Table 3). These radionuclides were determined to be the important fission product radionuclides in terms of dose to internal organs.

The user must provide the nuclear detonation yield. ORIGEN2-SAIC starts with an inventory produced by mixing the six fissionable material/neutron energy inventories. FIIDOS requires six yields in kilotons (kT) in order to combine the six fission product inventories as described above. The original version of FIIDOS had only one option; i.e. it required the user to give the yield for all six. This information may not be available, especially for the fission yields that were produced directly from 14-MeV neutrons.

Information about the fusion yield of the weapon is more likely to be available. Thus in FIIDOS2, FIIDOS3, and FIIDOS4, an additional option for specifying the total yields by fissile fuel isotope is provided. For this option, the total yield, each fissile isotope yield and the fusion yield are required. The six yield fractions are determined by solving a balance equation involving the amounts of energy released from fast fission, 14-MeV fission, and fusion. Information from calculations on a homogeneous sphere of fissile material is used to estimate some of the parameters in the balance equation to provide a reasonable approximation for dividing the fission yields between fast and 14-MeV types. The equations are encoded in the FISFRC.FOR subroutine and are too lengthy for inclusion here, but the results are illustrated in Figure 8. The main observation is that a small amount of fusion can produce a large increase in 14-MeV fission and this can result in an inventory change. An additional observation is that as the fusion fraction of the yield gets larger than 50%, a constant ratio between the fast and 14-MeV proportions develops, which is independent of the fusion fraction. These results are based on simplified balance equations and should be viewed as a non-rigorous method for determining the six fission yields. This option is recommended when detailed weapon yield information is not available.

FIIDOS determines the complete relative radionuclide inventory, which includes all fission product radionuclides present in nuclear debris or fallout at the exposure time and the measurement time.

#### **Activation Products**

ORIGEN2-SAIC calculates the decayed inventory for 17 activation products and their daughters (see Table 4). These radionuclides were selected because of their possible importance to internal organ doses. Data on the amount of each activation product radionuclide (Ci kT<sup>-1</sup>) initially produced by the nuclear weapon are input by the user (from LLNL, ca. 1970). FIIDOS calculates the amount of each activation product radionuclide present at either the exposure time or the measurement time. The inventory is normalized to 10<sup>14</sup> fissions to produce a relative radionuclide inventory of activation products.

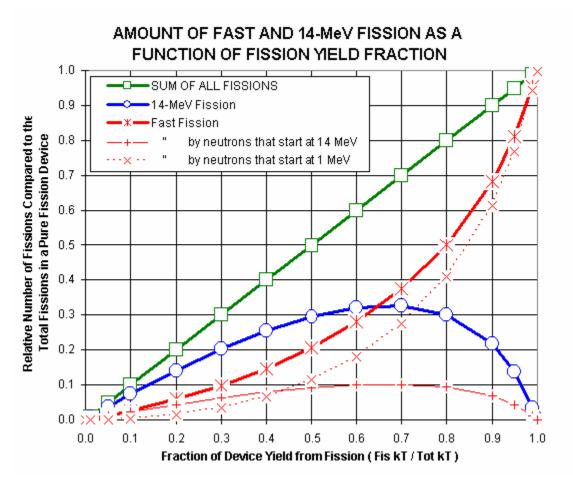


Figure 8. Fission fraction results from subroutine FISFRC.

Table 3. Fission product radionuclides and standard decay times\* used in FIIDOS.

Se-79	Y-92	Mo-105	Sb-129	Cs-134m	Pr-144
Br-82	Sr-93	Tc-105	Te-129	I-135	Pr-144m
Br-83	Y-93	Ru-105	Te-129m	Xe-135	Ce-145
Kr-83m	Zr-93	Rh-105	I-129	Xe-135m	Pr-145
Br-84	Nb-93m	Rh-105m	Sn-130	Cs-135	Ce-146
Br-85	Y-94	Ru-105	Sb-130m	Cs-136	Pr-146
Kr-85	Y-95	Rh-105	I-130	Xe-137	Ce-147
Kr-85m	Zr-95	Pd-107	Sb-131	Cs-137	Pr-147
Rb-86	Nb-95	Rh-109	Te-131	Ba-137m	Nd-147
Kr-87	Y-96	Pd-109	Te-131m	Xe-138	Pm-147
Rb-87	Zr-97	Ag-109m	I-131	Cs-138	Pr-148
Kr-88	Nb-97	Ag-110m	Xe-131m	Cs-139	Pm-148
Rb-88	Nb-97m	Ag-111	Sb-132	Ba-139	Pm-148m
Kr-89	Nb-98m	Cd-113m	Sb-132m	Cs-140	Pm-149
Rb-89	Mo-99	Cd-115m	Te-132	Ba-140	Pm-151
Sr-89	Tc-99	Sn-123	I-132	La-140	Sm-151
Rb-90	Tc-99m	Sb-124	Sb-133	Ba-141	Eu-152
Rb-90m	Mo-101	Sn-125	Te-133	La-141	Sm-153
Sr-90	Tc-101	Sb-125	Te-133m	Ce-141	Eu-154
Y-90	Mo-102	Te-125m	I-133	Ba-142	Eu-155
Rb-91	Tc-102	Sn-126	Xe-133	La-142	Eu-156
Sr-91	Tc-103	Sb-126	Xe-133m	La-143	Tb-160
Y-91	Ru-103	Sb-127	Te-134	Ce-143	Ho-166m
Y-91m	Rh-103m	Te-127	I-134	Pr-143	
Sr-92	Tc-104	Te-127m	Cs-134	Ce-144	
	St	andard Decay	Times (second	ds)	
0.001	0.00215	0.00464	0.01	0.0215	0.0464
0.1	0.215	0.464	1.	2.15	4.64
10	21.5	46.4	100.	215	464
$1.00 \times 10^{3}$	$2.15 \times 10^{3}$	$4.64 \times 10^{3}$	$1.00 \times 10^4$	$2.15 \times 10^4$	$4.64 \times 10^{4}$
$1.00 \times 10^{5}$	$2.15 \times 10^5$	$4.64 \times 10^{5}$	$1.00 \times 10^{6}$	$2.15 \times 10^6$	$4.64 \times 10^{6}$
$1.00 \times 10^{7}$	$2.15 \times 10^{7}$	$4.64 \times 10^{7}$	$1.00 \times 10^{8}$	$2.15 \times 10^{8}$	$4.64 \times 10^{8}$
$1.00 \times 10^9$	$2.15 \times 10^9$	$4.64 \times 10^{9}$	$1.00 \times 10^{10}$		
r = 3600  sec	1 day = 864	.00 sec 1 m	onth = $2.59 \times$	$10^6  \mathrm{sec}$ 1 v	$vear = 3.15 \times 10^7 sec$

1 hour = 3600 sec 1 day = 86400 sec 1 month =  $2.59 \times 10^6$  sec 1 year =  $3.15 \times 10^7$  sec

<sup>\*</sup> The FIIDOS database uses these 40 specific decay times for calculation of radionuclide inventories and spectra. Values for other decay times are obtained by one additional decay calculation from the nearest time.

#### Actinides

ORIGEN2-SAIC calculates the decayed inventory for 18 actinide radionuclides (see Table 5). These radionuclides are produced in a nuclear detonation or are remnant from the nuclear device. Data on the amount of each actinide radionuclide (Ci per kT) immediately after detonation are input by the user from radio-chemistry data (LLNL, ca. 1970). FIIDOS calculates the amount of each actinide radionuclide present at the exposure time and the measurement time. The inventory is normalized to 10<sup>14</sup> fissions to produce a relative radionuclide inventory of actinides.

Table 4. Activation product radionuclides.

Be- 7	Co- 58	W-187
Na-24	Co- 60	W-188
Mn-54	Cu- 64	Au-198
Fe-55	Cu- 67	Au-199
Fe-59	W-181	Pb-203
Co-57	W-185	

Table 5. Actinide product radionuclides.

Th-229	U-237	Pu-238
Th-230	U-238	Pu-239
Th-234	U-240	Pu-240
U-233	Np-237	Pu-241
U-234	Np-239	Am-241
U-235	Np-240	Cm-242

Table 6. Gaseous fission product radionuclides.

Kr-83 m	Kr -89	Xe-135 m
Kr-85	Xe-131 m	Xe-137
Kr-85 m	Xe-133	Xe-138
Kr-87	Xe-133 m	
Kr-88	Xe-135	

## **Inventory Modifications**

The fallout field produced by a nuclear weapon does not contain some of the fission products, such as noble gases, and the relative abundance of a specific radionuclide in the fallout field is not necessarily the same as that calculated by basic fission product buildup and depletion codes. FIIDOS provides a simple capability for the user to modify the fission product inventory to reflect these observations.

One form of fission product inventory modification involves the removal of the radionuclides of the gaseous fission products krypton and xenon (see Table 6). If this option is selected, FIIDOS automatically modifies the relative radionuclide inventory to give zero amounts for the gaseous fission products. FIIDOS also maintains a record of the amount of each gaseous fission product radionuclide deleted from the inventory, in order to adjust the gamma-ray emission spectrum (discussed in Section 2.2.6.3).

The second form of fission product inventory modification involves the adjustment of specific radionuclide inventories to reflect the effects of fission product fractionation. To implement this inventory modification option, the user must input a specific fractionation factor and gamma-ray emission data for each radionuclide affected. In FIIDOS, this factor is used as a multiplier to increase or decrease the amount of the radionuclide in the relative radionuclide inventory. FIIDOS maintains a record of the amount of each radionuclide removed from the inventory, so that the gamma-ray emission spectrum can be adjusted.

# 2.2.6 Radiological Contamination Scaling Factor

The parameter SF in Equation 2.20 is the radiological contamination scaling factor. The scaling factor is not a user-supplied input to FIIDOS. The factor is calculated within FIIDOS, and the units depend on the specified input options.

For those options in which the level of contamination is specified in terms of activity (Ci) or activity concentration (Ci m<sup>-3</sup> or Ci m<sup>-2</sup>), the scaling factor is calculated by:

$$SF = A_{ing} \times (A_T)^{-1} \tag{2.33}$$

$$SF = A_{inh} \times (A_T)^{-1} \tag{2.34}$$

$$SF = AC \times (A_T)^{-1} \text{ or}$$
 (2.35)

$$SF = SC \times (A_T)^{-1} \tag{2.36}$$

where:

 $A_{ing}$  = gross ingestion activity intake (Ci),

 $A_{inh}$  = gross inhalation activity intake (Ci),

AC = gross airborne activity concentration (Ci m<sup>-3</sup>),

SC = gross surface activity concentration (Ci m<sup>-2</sup>),

and

 $A_T$  = total activity of relative radionuclide inventory (Ci per 10<sup>14</sup> fissions).

The factor SF thus has units of  $10^{14}$  fissions,  $10^{14}$  fissions m<sup>-3</sup> or  $10^{14}$  fissions m<sup>-2</sup>, depending on the option selected.

For those options in which the level of contamination is specified in terms of radiation intensity (R hr<sup>-1</sup>), the scaling factor is calculated by:

$$SF = I_{ca} \times (\sum_{E} S_{T} \times \psi_{ca})^{-1}$$
 (2.37)

$$SF = I_{cs} \times (\sum_{E} S_T \times \psi_{cs})^{-1}$$
 (2.38)

$$SF = I_s \times (\sum_E S_T \times \psi_s)^{-1}$$
 (2.39)

where:

 $I_{ca}$  = radiation intensity aloft inside debris cloud (R hr<sup>-1</sup>),

 $I_{cs}$  = radiation intensity at surface inside debris cloud (R hr<sup>-1</sup>),

 $I_s$  = radiation intensity above contaminated surface (R hr<sup>-1</sup>),

 $S_T$  = rate of emission of gamma rays of energy E from relative radionuclide inventory ( $\gamma$  hr<sup>-1</sup> per 10<sup>14</sup> fissions), and

 $\psi_{ca}$ ,  $\psi_{cs}$ ,  $\psi_s$  = energy-dependent factors relating radiation intensity to a unit gamma ray volume, or surface, emission rate (R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup> m<sup>-3</sup> or R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup> m<sup>-2</sup>), for the selected exposure situation.

The factor SF has units of  $(10^{14} \text{ fissions m}^{-3})$  or  $(10^{14} \text{ fissions m}^{-2})$ , depending on the option selected.

The following sections discuss the quantities used in the calculation of the scaling factor SF. The user-supplied radiological measurement quantities are addressed in Section 2.2.6.1. The approach used in FIIDOS to determine the total activity of the relative radionuclide inventory,  $A_T$ , is described in Section 2.2.6.2. Section 2.2.6.3 addresses the FIIDOS procedures used to calculate the gamma-ray emission spectrum,  $S_T$ . The methods used to calculate the gamma-ray exposure factors,  $\psi_{ca}$ ,  $\psi_{cs}$ ,  $\psi_s$  are contained in FIIDOS are explained in Section 2.2.6.4.

## 2.2.6.1 Radiological Measurement Quantities

There are two basic types of radiological measurement quantities that are input by the user: gross (or isotope specific) activity or radiation intensity.

A gross activity radiological measurement quantity may be an ingestion activity intake (Ci), an inhalation activity intake (Ci), an airborne activity concentration (Ci m<sup>-3</sup>), or a surface activity concentration (Ci m<sup>-2</sup>). When a gross activity quantity is used, the user-supplied input must include the measured value and the time after burst at which the measurement was made. An option in FIIDOS allows the user to input the activity of a one specific isotope of the complete inventory. The corresponding gross activity is then determined for input into FIIDOS.

The other basic type of radiological measurement accommodated by FIIDOS is radiation intensity. When this type of radiological measurement is used, the user-supplied input data must include the measured value, the time at which the measurement was made, and identification parameters denoting the characteristics of the measurement device and the geometry of the measurement situation.

In FIIDOS, two types of gamma-ray radiation measurement devices are considered: a non-specific RADIAC meter and a radiation film badge. For the RADIAC meter, it is assumed that the measured radiation intensity will be reported in terms of the intensity in air (R hr<sup>-1</sup>) or a free-in-air, tissue dose rate (rad hr<sup>-1</sup>). The film badge is assumed to use DuPont Type 502 film shielded by a lead-tin laminate. The reported film badge dose rate (rem hr<sup>-1</sup>) can be for either free-in-air or in-situ irradiation conditions, and should be an average value based on the total film badge dose recorded for the period of exposure to airborne contaminants.

In FIIDOS, three geometric arrangements of the radiation intensity measurement situation are considered: the radiation measuring device may be above a contaminated surface, aloft inside a nuclear debris cloud, or at a near-surface position inside a nuclear debris cloud. More specific information on these geometries is provided in Section 2.2.6.4.

## 2.2.6.2 Total Activity of Relative Radionuclide Inventory

The relative radionuclide inventory, and the procedures used in FIIDOS to construct the inventory, are discussed in Section 2.2.5. It is important to recognize that for the scaling factor calculation, the relative radionuclide inventory must be referenced to the time at which the radiological measurement was performed. Note that it may be necessary for FIIDOS to determine the relative radionuclide inventory at the radiological measurement time for use in the determination of the gamma-ray emission spectrum. As is discussed in Section 2.2.6.3, radionuclide-specific information is utilized where the gamma-ray emission spectrum requires modification to reflect activation products, actinide elements, or fractionated fission products.

## 2.2.6.3 Gamma-ray Emission Spectrum

The gamma-ray emission spectrum is the gamma-ray emission rate from a model sample of nuclear debris or fallout based on 10<sup>14</sup> fissions. Since the gamma-ray emission spectrum is used in the calculation of a scaling factor keyed to a radiation intensity measurement, the spectrum is determined for the time at which the radiological measurement was performed. The spectrum is given in terms of an 18-energy group structure that spans a gamma-ray energy range from 0.010 MeV to 11.0 MeV.

The gamma-ray emission spectrum is constructed when FIIDOS calls the ORIGEN2-SAIC code. It includes the gamma rays from fission products, activation products, and actinide elements. If the FIIDOS user desires, the gamma-ray emission spectrum is modified to reflect fission product inventory adjustments due to gaseous fission product removal or fission product fractionation effects. The techniques used to construct the gamma-ray emission spectrum are described below.

# Fission Product Gamma Rays

FIIDOS calls the ORIGEN2-SAIC code which calculates the gamma-ray emission spectra for fission products produced by the fission of U-235, U-238, and Pu-239 by fast and 14-MeV neutrons. The spectra are based on 10<sup>14</sup> fissions with an instantaneous (i.e., 1 msec) irradiation time.

The spectral contribution from each fissionable material-neutron energy set is determined using the fission fraction of each set as was done for the relative radionuclide inventory. This spectral contribution is determined for the specified measurement time. The individual spectral contributions from 781 isotopes are summed within the ORIGEN2-SAIC code to obtain the total gamma-ray emission spectrum from the fission products.

#### Activation Product Gamma Rays

ORIGEN2-SAIC calculates the gamma-ray emission data for any of 688 activation product radionuclides of which 17 are currently used in calculating organ dose in FIIDOS (see Table 4). The data are presented in the form of gamma rays per disintegration in the 18-energy group structure.

# Actinide Element Gamma Rays

In the same manner as described for the activation products, FIIDOS obtains, for the radionuclides given in Table 5, the gamma-ray emission spectrum contributed by the actinide elements. ORIGEN2-SAIC calculates the gamma-ray emission data for any of 129 actinides, of which 18 are currently used in calculating organ dose in FIIDOS.

## Spectrum Modifications

As is the case with the relative radionuclide inventory construction described in Section 2.2.5, FIIDOS provides the capability to modify the gamma-ray emission spectrum to reflect the effects of gaseous fission product removal or fission product radionuclide fractionation.

Based on prior calculations of the relative radionuclide inventory at the measurement time, information is available on the amount (Ci per 10<sup>14</sup> fissions) of each gaseous fission product radionuclide and fractionated fission product radionuclide removed from the relative radionuclide inventory.

Gamma-ray emission data, in the form of gamma rays per disintegration in the 18-energy group structure, are available in FIIDOS for specific gaseous fission product radionuclides (see Table 6). However, similar data for fractionated fission product radionuclides is not currently accessed in FIIDOS, but must be provided as user-supplied input in conjunction with the user-supplied radionuclide fractionation factors discussed in Section 2.2.5.

By considering the amount of each radionuclide removed from the relative radionuclide inventory and the gamma-ray emission data for the radionuclide, FIIDOS determines the necessary gamma-ray emission spectrum modifications.

The isotope fractionation method in FIIDOS is the same as in the original version of FIIDOS. However, because the complete inventory and gamma spectrum are being generated at all 40 time steps and can be accessed at any measurement time, future modifications are possible so as to use ORIGEN2-SAIC to fractionate the inventory.

## Gamma-ray Energy Group Structure

At this point, it should be noted that the 18-energy group structure used for the gamma-ray emission spectrum does not exactly match the energy group structure that is used for the gamma-ray exposure factor discussed in Section 2.2.6.4. Since the FIIDOS methodology uses the product of the gamma-ray emission spectrum and the gamma-ray exposure factor, the energy group structure of the emission spectrum is modified to make the two energy group structures compatible.

As seen in Table 7, the first 15 gamma-ray spectrum energy groups from ORIGEN match

the last 15 exposure factor energy groups from radiation transport cross section of DLC-31 (Bartine, 1977); however, the 16<sup>th</sup> gamma-ray spectrum energy group (4.0 - 6.0 MeV) encompasses both the 5<sup>th</sup> (5.0 - 6.0 MeV) and the 6<sup>th</sup> (4.0 - 5.0 MeV) exposure factor energy groups. To accommodate this mismatch, the 16<sup>th</sup> gamma-ray spectrum energy group is subdivided into two groups with 55% of the gamma ray emission rate assigned to a 4.0 - 5.0 MeV energy group and 45% of the emission rate assigned to a 5.0 - 6.0 MeV energy group. This 55% - 45% gamma ray emission rate allocation results in a 50% - 50% energy emission rate allocation to each of the two groups. Table 7 also shows that the energy group structures mismatch for the last two gamma-ray spectrum energy groups and the first four exposure factor energy groups. However, these mismatches are not important, since the nuclear debris or fallout does not emit any high energy gamma rays associated with the 17<sup>th</sup> and 18<sup>th</sup> gamma-ray spectrum energy groups.

## 2.2.6.4 Gamma-ray Exposure Factor

The gamma-ray exposure factor (R hr<sup>-1</sup>, rad hr<sup>-1</sup>, rem hr<sup>-1</sup> per  $\gamma$  sec<sup>-1</sup> m<sup>-2</sup> or  $\gamma$  sec<sup>-1</sup> m<sup>-3</sup>) is the exposure rate resulting from a unit gamma-ray surface, or volume, emission rate. The factor is in terms of a 21-energy group structure that spans a gamma-ray energy range from 0.01 MeV to 14.0 MeV. The gamma-ray exposure factor is dependent upon the characteristics of the radiation measurement device and the geometry of the radiation measurement situation.

The radiation measurement devices considered include a non-specific radical meter that measures either intensity in air (R hr<sup>-1</sup>) or tissue dose rate (rad hr<sup>-1</sup>), and a radiation film badge that provides a dose rate (rem hr<sup>-1</sup>) value based on a measured dose and exposure duration. The gamma-ray response functions for these devices are shown in Table 8. For air, the conversion from gamma-ray fluence (γ sec<sup>-1</sup>) to radiation intensity (R hr<sup>-1</sup>) is based on the ICRU recommendations in NBS Handbook 85 (NBS, 1964), restructured to a 21-energy group structure. Tissue is as represented by elements of a man-phantom described by Snyder (1974). The film badge response is for DuPont Type 502 film shielded by a lead-tin laminate, with the approximation of normally incident radiation (DNA, 1979a).

The radiation measurement situations considered include radiation intensity above a contaminated surface, radiation intensity aloft inside a debris cloud, and radiation intensity at the surface inside a debris cloud. The methodology used to calculate the gamma-ray exposure factor for each of these measurement situations is described below.

Table 7. Gamma-ray energy group structures.

Groui	ORIGEN2 Energy Range (MeV)	Grou	DLC-31 p Energy Range (MeV)
Group	<u>S Energy Italigo (ivio v )</u>	Grou	<u>p Energy Runge (1110 + )</u>
1	0.010-0.020	21	0.010-0.020
2	0.020-0.030	20	0.020-0.030
3	0.030-0.045	19	0.030-0.045
4	0.045-0.070	18	0.045-0.070
5	0.070-0.100	17	0.070-0.100
6	0.100-0.150	16	0.100-0.150
7	0.150-0.300	15	0.150-0.300
8	0.300-0.450	14	0.300-0.450
9	0.450-0.700	13	0.450-0.700
10	0.700-1.000	12	0.700-1.000
11	1.000-1.500	11	1.000-1.500
12	1.500-2.000	10	1.500-2.000
13	2.000-2.500	9	2.000-2.500
14	2.500-3.000	8	2.500-3.000
15	3.000-4.000	7	3.000-4.000
16	4.000-6.000	6	4.000-5.000
17	6.000-8.000	5	5.000-6.000
18	8.000-11.00	4	6.000-7.000
		3	7.000-8.000
		2	8.000-10.000
		1	10.000-14.000

Table 8. Gamma-ray response functions.

Energy	Range	(MeV)	Tissue(1)	Air(2) (P. par sam <sup>-2</sup> )	Film Badge(3)
			$(rad per \gamma - cm^{-2})$	$(R \text{ per } \gamma \text{-cm}^{-2})$	$(\text{rem per } \gamma \text{-cm}^{-2})$
0.010	-	0.020	$4.378 \times 10^{-10}$	$4.320 \times 10^{-10}$	0.000
0.020	-	0.030	$1.359 \times 10^{-10}$	$1.340 \times 10^{-10}$	0.000
0.030	-	0.045	$6.166 \times 10^{-11}$	$5.850 \times 10^{-11}$	$7.908 \times 10^{-14}$
0.045	-	0.070	$3.615 \times 10^{-11}$	$3.580 \times 10^{-11}$	$3.310 \times 10^{-12}$
0.070	-	0.100	$3.766 \times 10^{-11}$	$3.690 \times 10^{-11}$	$2.284 \times 10^{-11}$
0.100	-	0.150	$5.352 \times 10^{-11}$	$5.560 \times 10^{-11}$	$3.919 \times 10^{-11}$
0.150	-	0.300	$1.085 \times 10^{-10}$	$1.130 \times 10^{-10}$	$9.827 \times 10^{-11}$
0.300	-	0.450	$1.931 \times 10^{-10}$	$2.010 \times 10^{-10}$	$1.821 \times 10^{-10}$
0.450	-	0.700	$2.979 \times 10^{-10}$	$3.110 \times 10^{-10}$	$2.850 \times 10^{-10}$
0.700	-	1.000	$4.262 \times 10^{-10}$	$4.410 \times 10^{-10}$	$4.111 \times 10^{-10}$
1.000	-	1.500	$5.839 \times 10^{-10}$	$6.020 \times 10^{-10}$	$5.887 \times 10^{-10}$
1.500	-	2.000	$7.498 \times 10^{-10}$	$7.750 \times 10^{-10}$	$7.826 \times 10^{-10}$
2.000	-	2.500	$8.933 \times 10^{-10}$	$9.280 \times 10^{-10}$	$9.317 \times 10^{-10}$
2.500	-	3.000	$1.023 \times 10^{-9}$	$1.050 \times 10^{-9}$	$1.065 \times 10^{-9}$
3.000	-	4.000	$1.202 \times 10^{-9}$	$1.240 \times 10^{-9}$	$1.253 \times 10^{-9}$
4.000	-	5.000	$1.423 \times 10^{-9}$	$1.470 \times 10^{-9}$	$1.488 \times 10^{-9}$
5.000	-	6.000	$1.630 \times 10^{-9}$	$1.690 \times 10^{-9}$	$1.709 \times 10^{-9}$
6.000	-	7.000	$1.829 \times 10^{-9}$	$1.920 \times 10^{-9}$	$1.942 \times 10^{-9}$
7.000	-	8.000	$2.028 \times 10^{-9}$	$2.100 \times 10^{-9}$	$2.114 \times 10^{-9}$
8.000	-	10.000	$2.338 \times 10^{-9}$	$2.440 \times 10^{-9}$	$2.458 \times 10^{-9}$
10.000	-	14.000	$2.949 \times 10^{-9}$	$3.060 \times 10^{-9}$	$3.088 \times 10^{-9}$

- (1) MIRD (Snyder) Phantom (Snyder, 1974).
- (2) ICRU recommended values restructured to 21-energy group structure (NBS, 1964).
- (3) DuPont Type 502 film shielding by a tin-lead laminate (DNA, 1979a).

# Radiation Intensity Above a Contaminated Surface

The source term for this gamma-ray exposure factor calculation is a soil slab of infinite lateral dimensions, having a thickness of 1 meter. The soil is represented by Area 7 Nevada Test Site soil, described in Table 9 (DNA, 1979b). The radioactive material within the soil slab is modeled as two planar sources of equal source strength, one at a depth of 0.25 cm and the other at a depth of 0.75 cm. This depth distribution is not meant to indicate the actual distribution of radioactivity in the soil, but is simply a mechanism used to account for the shielding effect of ground roughness. As shown in Figure 9 (Glasstone, 1977), this modeling gives a ground roughness factor that compares favorably with the value of 0.7, commonly mentioned in the fallout literature. The

gamma-ray exposure factor for the RADIAC meter is given for a free-in-air, unshielded condition. The meter is assumed to be located at a height of one meter above the contaminated surface.

The gamma-ray exposure factor for the film badge is given for both free-in-air and in-situ conditions. In the free-in-air condition, no consideration is given to the partial shielding of the film badge by the human body. For the in-situ conditions, the human body is represented by a man phantom model, and the film badge is taken to be a point on the chest of the model, see Figure 10 (Kaul, 1977). The shielding effectiveness of the body depends upon the geometric characterization of the irradiation as affected by the orientation of the body and the characteristics of the radiation. The calculated distribution of a representative fallout field radiation environment is shown in Figure 11. A badged individual passing through the field, walking erect, would thus be exposed primarily in his polar midplane to azimuthally isotropic radiation. On the other hand, an individual assuming random orientations while in the field, perhaps by reason of some assigned task, would be exposed in a more generally isotropic fashion. Therefore, FIIDOS includes separate film badge exposure factors for these two situations, calculated on the basis of azimuthally isotropic, polar midplane exposure in the case of a standing individual and on the basis of isotropic exposure for a man assuming various random orientations while in the fallout field. The body provides more effective shielding of the film badge for conditions of isotropic exposure than that in the midplane. Therefore, the film badge gamma-ray exposure factors for in-situ (isotropic) irradiation are less than the factors for in-situ (midplane) irradiation. Leaving aside the differences between isotropic or midplane irradiation, the ratio of in-situ dose to free-in-air dose ranges from 0.5 for low energy gamma rays to 0.9 for high energy gamma rays; for a typical fallout radiation gamma-ray spectrum, the ratio is approximately 0.7. Thus, the overall efficiency in transmission of gamma-ray emissions from fallout to a in-situ film badge, considering both body shielding and ground roughness, is approximately 0.5.

Table 9. Elemental composition of Nevada Test Site\* soil.

<u>Element</u>	Weight Percent	Element	Weight Percent
H(organic)	0.50	P	0.02
H(water)	0.66	S	0.03
$\mathbf{C}$	0.90	Cl	0.08
N	0.01	K	1.92
O	50.85	Ca	6.72
Na	0.79	Ti	0.13
Mg	2.04	Mn	0.071
Al	7.61	Fe	1.5
Si	25.03	Other	1.14

<sup>\*</sup> As represented by Area 7 (DNA, 1979b).

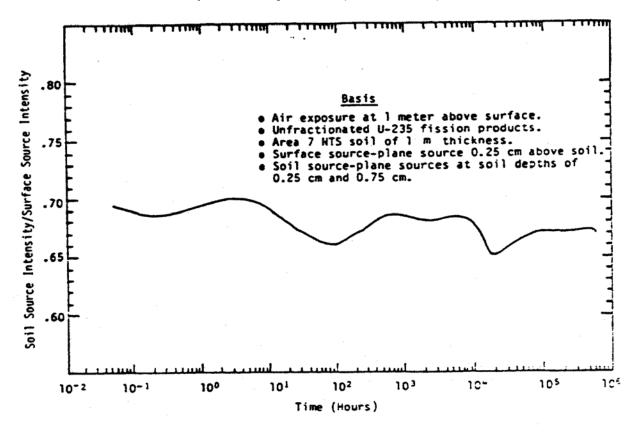


Figure 9. Equivalent ground roughness for soil source.

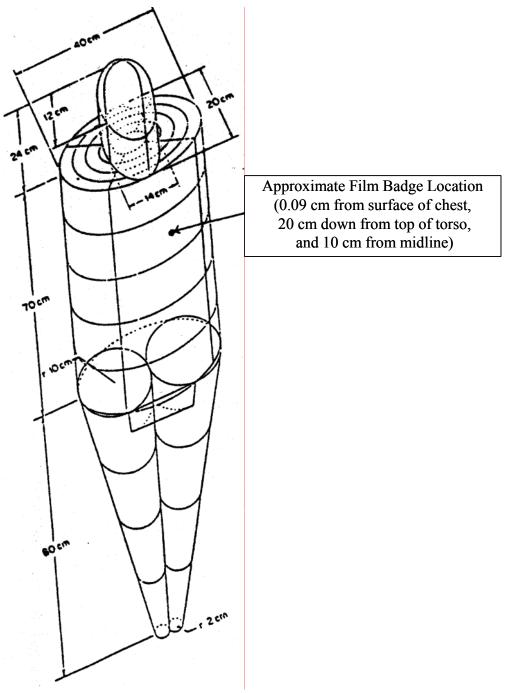


Figure 10. Man phantom model.

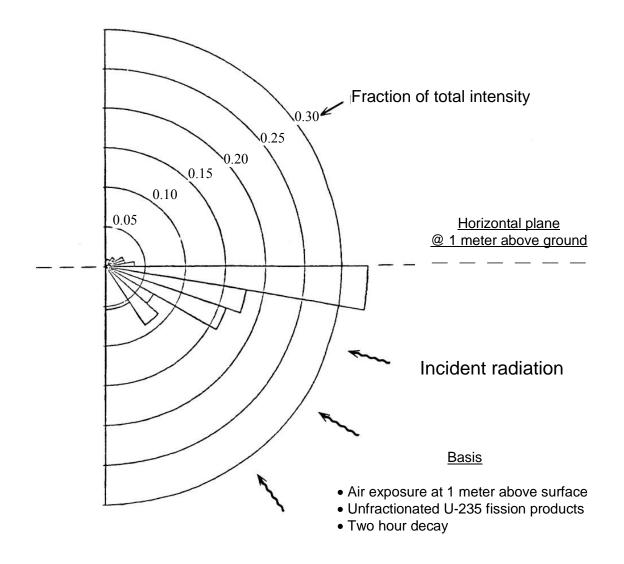


Figure 11. Angular contribution of fallout intensity.

The radiation transport calculations of the gamma-ray exposure factors were performed using the code ANISN (Engle, 1973). The calculations were performed for the 21-energy group structure shown earlier in Table 7. The atmosphere was modeled as low-humidity air at the NTS elevation based on meteorological data typical of Operation TEAPOT (NDL, 1965). That the film badge response uses the approximation of normally incident radiation principally affects the small exposure factors at low energies (which contribute minimally to dose from a fallout field). The comparison among film badge orientations of the exposure factors at such energies is not meaningful.

Table 10 provides the gamma-ray exposure factor for radiation intensity above a contaminated surface.

## Radiation Intensity Aloft Inside Debris Cloud

This gamma-ray exposure factor is calculated using an adaptation of the method given in Meteorology and Atomic Energy (Slade, 1968). It is assumed that the debris cloud is effectively infinite in extent; i.e. of uniform contamination density throughout the range of gamma-ray radiation. The gamma-ray exposure factor given in Table 11 is for a radical meter that measures intensity in air (R hr<sup>-1</sup>), unshielded, within a debris cloud.

## Radiation Intensity at Surface Inside Debris Cloud

This gamma-ray exposure factor is determined using the same procedures cited above for radiation intensity inside a debris cloud, except that the bottom half of the cloud is assumed to be replaced by the ground. Accordingly, the gamma-ray exposure factor for the radiation intensity below the cloud is one-half of the exposure factor inside the cloud.

## 2.3 LIMITATIONS OF TECHNICAL APPROACH

FIIDOS is designed to provide a tool for calculating the radiation dose to various body organs that would result from the ingestion or inhalation of nuclear weapon fallout. While FIIDOS is intended for use in the assessment of radiation exposure of military personnel from atmospheric nuclear detonations, its calculation flexibility facilitates additional applications. The technical approach adopted for FIIDOS is adequate for the purposes of its intended application; however, there are limitations of the technical approach that should be identified to avoid a misuse of FIIDOS or a misunderstanding of FIIDOS results. The limitations encompass both the methodology and the data used in FIIDOS.

Three aspects of the methodology impose limitations on the application of FIIDOS. All three relate to the use of a radiological measurement to characterize a radiological environment. First, it must be recognized that the radiological measurement quantifies the radioactive contamination at a specific location. The radiological environment that FIIDOS calculates is referenced to this same location. FIIDOS does not provide a mechanism for translating a radiological measurement at one location to another location. Second, when a radiological measurement at one time is used to determine the radiological environment at a different time, the only effect that FIIDOS considers is radioactive decay. Decontamination and other effects that alter the distribution of the radioactive material, such as wind and rain, are not included in the FIIDOS methodology. Third, the association of the radiological hazard with the radiological measurement is valid only as long as the fallout debris emits sufficient gamma-ray radiation to give meaningful measurements. This condition exists in a fresh fallout field and continues for several years; however, after some time, the fallout radiation level will become indistinguishable from the prevailing background radiation level. At these late times, the fallout material could still contain some radionuclides that contribute significantly to an

internal dose, even though the gamma-ray radiation emission rate from the fallout material is low.

Table 10. Gamma-ray exposure factor for surface contamination.

# Gamma-ray Exposure Factor (units as measured per $\gamma \, hr^{-1} \, cm^{-2}$ )

	_	_	Film B	adge (Sn-Pb S	Shielded Type	502)
	Energy	Tissue	Air		In-Situ	In-Situ
	Range	Free-In-Air	Free-In-Air	Free-In-Air	(Midplane)	(Isotropic)
<u>Group</u>	(MeV)	<u>(rad hr<sup>-1</sup>)</u>	$(R hr^{-1})$	<u>(rem hr<sup>-1</sup>)</u>	(rem hr <sup>-1</sup> )	<u>(rem hr<sup>-1</sup>)</u>
		0	0	0	0	0
1	10.0-14.0	$5.75 \times 10^{-9}$	$5.96 \times 10^{-9}$	$5.99 \times 10^{-9}$	$5.41 \times 10^{-9}$	$5.05 \times 10^{-9}$
2	8.0-10.0	$4.57 \times 10^{-9}$	$4.77 \times 10^{-9}$	$4.78 \times 10^{-9}$	$3.93 \times 10^{-9}$	$3.88 \times 10^{-9}$
3	7.0-8.0	$3.97 \times 10^{-9}$	$4.11 \times 10^{-9}$	$4.11 \times 10^{-9}$	$4.08 \times 10^{-9}$	$3.63 \times 10^{-9}$
4	6.0-7.0	$3.57 \times 10^{-9}$	$3.74 \times 10^{-9}$	$3.76 \times 10^{-9}$	$3.27 \times 10^{-9}$	$3.23 \times 10^{-9}$
5	5.0-6.0	$3.17 \times 10^{-9}$	$3.29 \times 10^{-9}$	$3.30 \times 10^{-9}$	$2.77 \times 10^{-9}$	$2.65 \times 10^{-9}$
6	4.0-5.0	$2.75 \times 10^{-9}$	$2.84 \times 10^{-9}$	$2.85 \times 10^{-9}$	$2.12 \times 10^{-9}$	$2.27 \times 10^{-9}$
7	3.0-4.0	$2.30 \times 10^{-9}$	$2.37 \times 10^{-9}$	$2.37 \times 10^{-9}$	$2.07 \times 10^{-9}$	$1.91 \times 10^{-9}$
8	2.5-3.0	$1.93 \times 10^{-9}$	$1.98 \times 10^{-9}$	$1.98 \times 10^{-9}$	$1.65 \times 10^{-9}$	$1.62 \times 10^{-9}$
9	2.0-2.5	$1.66 \times 10^{-9}$	$1.73 \times 10^{-9}$	$1.71 \times 10^{-9}$	$1.58 \times 10^{-9}$	$1.40 \times 10^{-9}$
10	1.5-2.0	$1.38 \times 10^{-9}$	$1.42 \times 10^{-9}$	$1.41 \times 10^{-9}$	$1.17 \times 10^{-9}$	$1.10 \times 10^{-9}$
11	1.0-1.5	$1.06 \times 10^{-9}$	$1.09 \times 10^{-9}$	$1.04 \times 10^{-9}$	$8.91 \times 10^{-10}$	$8.31 \times 10^{-10}$
12	0.7 - 1.0	$7.66 \times 10^{-10}$	$7.93 \times 10^{-10}$	$7.20 \times 10^{-10}$	$5.64 \times 10^{-10}$	$5.36 \times 10^{-10}$
13	.4570	$5.46 \times 10^{-10}$	$5.68 \times 10^{-10}$	$5.01 \times 10^{-10}$	$4.21 \times 10^{-10}$	$4.04 \times 10^{-10}$
14	.3045	$3.69 \times 10^{-10}$	$3.83 \times 10^{-10}$	$3.21 \times 10^{-10}$	$2.63 \times 10^{-10}$	$2.61 \times 10^{-10}$
15	.1530	$2.22 \times 10^{-10}$	$2.29 \times 10^{-10}$	$1.80 \times 10^{-10}$	$1.54 \times 10^{-10}$	$1.48 \times 10^{-10}$
16	.1015	$1.12 \times 10^{-10}$	$1.14 \times 10^{-10}$	$6.65 \times 10^{-11}$	$6.32 \times 10^{-11}$	$5.88 \times 10^{-11}$
17	.0710	$7.52 \times 10^{-11}$	$7.37 \times 10^{-11}$	$3.07 \times 10^{-11}$	$2.91 \times 10^{-11}$	$2.57 \times 10^{-11}$
18	.045070	$5.43 \times 10^{-11}$	$5.33 \times 10^{-11}$	$3.94 \times 10^{-12}$	$3.58 \times 10^{-12}$	$3.14 \times 10^{-12}$
19	.030045	$4.10 \times 10^{-11}$	$3.90 \times 10^{-11}$	$4.75 \times 10^{-14}$	$2.96 \times 10^{-14}$	$3.23 \times 10^{-14}$
20	.020030	$2.64 \times 10^{-11}$	$2.61 \times 10^{-11}$	0	0	0
21	.010020	$9.94 \times 10^{-12}$	$9.80 \times 10^{-12}$	0	0	0

Table 11. Gamma-ray exposure factor for airborne contamination.

Gamma-ray <u>Group</u>	Free Air Energy Range (MeV)	Gamma-ray Exposure Factor (R hr <sup>-1</sup> per γ hr <sup>-1</sup> m <sup>-3</sup> )
Group  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	(MeV)  10.0-14.0 8.0-10.0 7.0-8.0 6.0-7.0 5.0-6.0 4.0-5.0 3.0-4.0 2.5-3.0 2.0-2.5 1.5-2.0 1.0-1.5 0.7-1.0 0.45-0.70 0.30-0.45 0.15-0.30 0.10-0.15 0.07-0.10 0.045-0.070 0.030-0.045	$1.69 \times 10^{-10}$ $1.27 \times 10^{-10}$ $1.06 \times 10^{-10}$ $9.14 \times 10^{-11}$ $7.73 \times 10^{-11}$ $6.33 \times 10^{-11}$ $4.92 \times 10^{-11}$ $3.16 \times 10^{-11}$ $1.76 \times 10^{-11}$ $1.20 \times 10^{-11}$ $8.09 \times 10^{-12}$ $7.38 \times 10^{-12}$ $1.76 \times 10^{-12}$ $1.76 \times 10^{-12}$ $1.76 \times 10^{-12}$ $1.20 \times 10^{-12}$ $1.30 \times 10^{-12}$ $1.30 \times 10^{-12}$ $1.30 \times 10^{-13}$ $1.30 \times 10^{-13}$
20 21	0.020-0.030 0.010-0.020	$3.52 \times 10^{-13} \\ 2.11 \times 10^{-13}$

Limitations on the accuracy of FIIDOS-calculated organ doses arise from data internal to FIIDOS and user-supplied input data. One major limitation of the original FIIDOS code was that the ORIGEN2 database lacked many early gamma rays, especially before 5 minutes. The ORIGEN2-SAIC calculated gamma-ray spectra are very accurate, even to early times, as was demonstrated by the excellent agreement with measurements and other calculations (Roberts, 1996).

The ORIGEN2-SAIC code calculates up to 1600 total isotopes in the inventory. FIIDOS currently uses only 148 of the 781 fission product radionuclides available from ORIGEN2-SAIC for determining internal dose. Most of the other isotopes make a negligible contribution to internal dose because they decay before the earliest fallout deposition times.

Dose conversion factors for short-lived radionuclides are low values, especially for organs outside the organ of uptake. Most radionuclides lacking dose conversion factors have half-lives of a few minutes or less. In this early period, distribution of radionuclides to other organs is limited. The shorter-lived radionuclides included in Appendix A, Tables A-1 and A-2 clearly demonstrate these effects.

The upper limit of the organ dose at early times has been crudely estimated by assuming the radionuclides lacking dose conversion factors in FIIDOS have a dose conversion factor similar to the rest of the inventory. The potential upper limit of the organ dose was then 41 percent more if inhaled at 3 minutes, 7 percent more at 9 minutes, and 4 percent more at 30 minutes than obtained by FIIDOS.

The original version of FIIDOS was based on ORIGEN2 calculations with a very incomplete gamma-ray spectra database from only 180 isotopes. With FIIDOS, the time-dependent gamma-ray emission spectrum of the weapon debris is determined from spectra calculated by ORIGEN2-SAIC. The ORIGEN2-SAIC database contains spectral information on 781 fission-product radionuclides.

The 148 fission products radionuclides in the FIIDOS inventory include most fission-product nuclides of biological significance beyond the first minutes of decay. The FIIDOS code can easily be expanded to include dose from the other isotopes calculated by ORIGEN2-SAIC to accommodate more dose coefficients.

The choice of 18 actinides appears to introduce some problems when in much degraded fallout fields. The daughters and granddaughters of these 18 isotopes can contribute doses comparable to the parent's dose. Because the daughters are not included in the FIIDOS inventory, their dose will be unaccounted.

#### **SECTION 3**

#### **COMPUTER PROGRAM**

#### 3.1 INTRODUCTION

The computer program FIIDOS is written in FORTRAN primarily for operation on an IBM-compatible PC running Windows (95-XP), but could easily be recompiled for use on a UNIX workstation or an Apple Macintosh computer. A typical FIIDOS problem has a running time of about 1 second, with more complicated problems being completed in less than 5 seconds.

FIIDOS consists of a main program, eighteen subroutines and the code ORIGEN2-SAIC with its subroutines. FIIDOS uses a data library that has several files containing problem-independent data. User input provides problem-dependent data and program control instructions. Program output occurs in sequential fashion from the main program and selected subroutines.

The equations and operations of the computer code FIIDOS are discussed in Section 3.2. The main program and subroutines, data library, user input, and program output for FIIDOS are discussed in Sections 3.3, 3.4, 3.5, and 3.6, respectively. FORTRAN listing of the main program and subroutines is provided in Appendix B.

# 3.2 EQUATIONS AND OPERATIONS

The equations used in FIIDOS for calculating the committed organ dose resulting from the intake of a radionuclide are computerized versions of Equations 2.20 through 2.27 given in Section 2. The computer equations and their parameters are given in Figure 12.

Figure 13 illustrates, in a simplified manner, the concept of the computer code FIIDOS. The relationship of the FIIDOS data library and processing to the user-supplied inputs is shown

The actual sequence of operations used by the computer code FIIDOS is shown in Figure 14. Each element of the flow diagram is numbered to facilitate subsequent discussion of the program.

As seen in Figure 14, the first five elements of the flow diagram are concerned with the input data handling and some preliminary calculations. The procedure to calculate the radiological contamination scaling factor is reflected by elements 6 through 11. The path followed from element 6 to 11 depends upon whether the radiological measurement is of gross activity or radiation intensity, with or without modifications to the gamma-ray emission spectrum to reflect activation products, actinide elements, or fractionated fission products. The procedure to calculate the relative radionuclide inventory at the time of exposure is reflected in element 12. The calculation of the organ dose occurs at element 13. At that point, the program flow branches. If integrated (chronic) doses are to be

calculated, a loop is entered (elements 15 to 18) which calculates the relative radionuclide inventory at each standard time after the start of the exposure and up to the end of the exposure period. The resulting dose increments from exposure to those inventories are summed to produce a total dose. The integrated exposure branch is rejoined by the acute exposure branch at element 19 and, if requested, the intermediate results are written to the output file. If the calculation is complete (no additional exposures), then the program ends and the final output is written. Otherwise, the program flow returns to element 6 as many times as required.

## 3.3 MAIN PROGRAM AND SUBROUTINES

FIIDOS consists of a main program, eighteen subroutines and the code ORIGEN2-SAIC. Figure 15 shows the basic organization and hierarchy of FIIDOS. The main program controls the execution of FIIDOS. The actual problem calculations are performed by the subroutines. Each routine is briefly described below.

Program MAIN is the control module for FIIDOS. The basic flow of program MAIN is shown in Figure 14. As seen in the figure, program MAIN consists primarily of decisions for branching and calls for subroutines. Program variables appearing in the diagram are discussed in Section 3.5 as follows: ITRM--Item 6; and ITPM--Item 2.

Subroutine INPUT obtains the input data provided by the FIIDOS user. A discussion of the user input data is given in Section 3.5.

Subroutine FISFRC converts the weapon yield data provided by the user in units of kilotons into the relative number of fissions for each fissionable material-neutron energy set. The fissionable materials considered include U-235, U-238, and Pu-239; the neutron energies considered include fast neutrons and 14-MeV neutrons.

Subroutine ORGSRC prepares the input for the ORIGEN2-SAIC code.

Subroutine RRI calculates the relative radionuclide inventory of a mixture of radionuclides at a specified time of concern, which can be either the measurement time or the exposure time. Subroutine RRI itself is a control module; as shown in Figure 15, subroutine RRI has five subordinate modules that perform the inventory-related calculations.

Subroutine GFPI accepts the relative radionuclide inventory of fission products calculated by ORIGEN2-SAIC.

Subroutine KRXERI determines the amount of each krypton and xenon radionuclide removed from the relative radionuclide inventory of fission products, if required.

$$D(I,J) = DUR \times BR \times AKFAC \times DCF(I,J) \times AFP(I) \times SF \times 10^{6}$$
 (3.1)

with,

$$SF = ACTMES \times (ACTOT)^{-1} \tag{3.2}$$

or

$$SF = RIMES \times (\sum_{E} SPEC \times GREF)^{-1}$$
(3.3)

where:

D(I,J) =dose commitment (rem) to organ J from radionuclide I,

DUR = duration of exposure (hr),

BR = breathing rate (m<sup>3</sup> hr<sup>-1</sup>),

AKFAC = airborne activity-surface activity ratio (Ci m<sup>-3</sup> per Ci m<sup>-2</sup>), or resuspension factor (m<sup>-1</sup>),

DCF(I,J) =dose conversion factor (rem  $\mu \text{Ci}^{-1}$ ) for the dose to organ J resulting from the ingestion or inhalation of radionuclide I, and

AFP(I) = amount of radionuclide I (Ci per  $10^{14}$  fissions) in the relative radionuclide inventory of the nuclear debris (note that AFP pertains to fission products.

Similar parameters are defined for activation products and actinide elements),

SF = radiological contamination scaling factor ( $10^{14}$  fissions,  $10^{14}$  fissions m<sup>-2</sup>, or  $10^{14}$  fissions m<sup>-3</sup>),

ACTMES = measured gross activity intake (Ci), surface concentration (Ci m<sup>-2</sup>) or airborne concentration (Ci m<sup>-3</sup>),

ACTTOT = total activity of relative radionuclide inventory (Ci per  $10^{14}$  fissions),

*RIMES* = measured radiation intensity (R hr<sup>-1</sup>) above contaminated surface, at surface inside debris cloud, or aloft inside debris cloud,

SPEC = rate of emission of gamma-rays of energy E from relative radionuclide inventory ( $\gamma$  hr<sup>-1</sup> per 10<sup>14</sup> fissions), and

GREF = energy-dependent factor of energy E, relating radiation intensity (R hr<sup>-1</sup>) to gamma-ray emission rate from contaminated surface  $(\gamma \text{ hr}^{-1} \text{ m}^{-2})$  or debris cloud  $(\gamma \text{ hr}^{-1} \text{ m}^{-3})$ .

Figure 12. Dose equations for computer calculations.

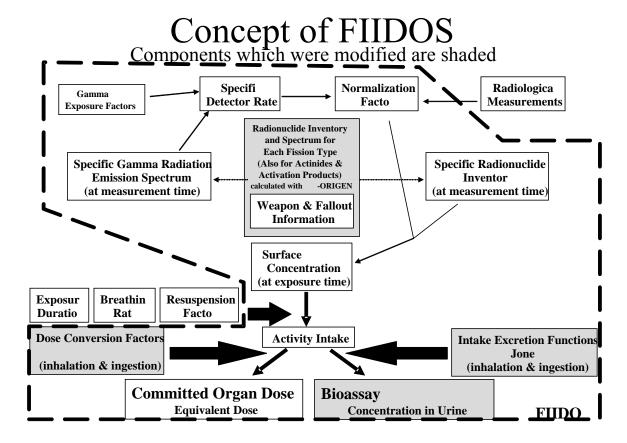
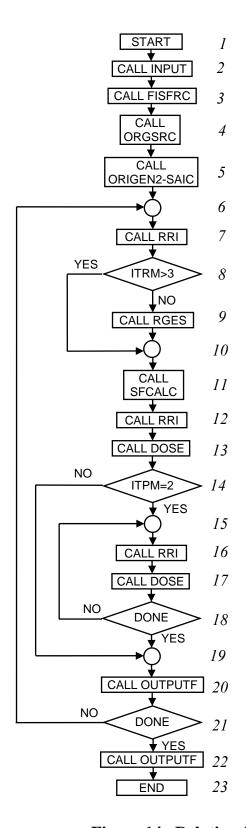


Figure 13. Concept of FIIDOS.



- 1. Start of program MAIN.
- Subroutine INPUT reads the input data provided by the user.
- Subroutine FISFRC converts the weapon yield in KT into relative number of fissions for each fissionable material-neutron energy set.
- Subroutine ORGSRC converts user input into ORIGEN2-SAIC input.
- Subroutine ORIGEN2-SAIC combines inventories and decays them to times of interest.
- Connector shows point in MAIN where problem is reentered for multiple measurement/exposure pairs.
- 7. Subroutine RRI calculates the relative radionuclide inventory at the time of measurement for the purposes of 1) modifying the relative gamma emission spectrum and 2) providing the necessary inventory information to calculate the scaling factor.
- Decision for branching based on whether radiological measurement is gross activity or radiation intensity.
- Subroutine RGES calculates the relative gamma emission spectrum used to generate the scaling factor (only for intensity-based measurements).
- Connector shows point where branches rejoin the program flow.
- Subroutine SFCALC calculates the scaling factor based on the measured radiological quantity.
- 12. Subroutine RRI calculates the relative radionuclide inventory at the time of exposure.
- 13. Subroutine DOSE calculates the inhalation and ingestion dose to organs and the Pu-239 excretion.
- 14. Decision for branching based on integrated (chronic) versus acute exposures.
- Connector shows reentry point in program flow for integrated exposures.
- 16. Subroutine RRI calculates the relative radionuclide inventory for each intermediate time of exposure and at the end of the exposure.
- Subroutine DOSE calculates each increment of internal dose and Pu-239 excretion for integrated exposures.
- Decision for branching based on completion of the integrated dose calculation.
- Connector shows point where the acute and integrated exposure branches rejoin after the total dose is calculated for a single measurement/exposure pair.
- Subroutine OUTPUTF prints the intermediate results of each measurement/exposure pair (if requested).
- Decision for branching based on completion of calculations of dose for all measurement/exposure pairs.
- Subroutine OUTPUTF prints the final total internal doses and the total Pu-239 excretions from all exposures.
- 23. End of program.

Figure 14. Relationship of principal subroutines.

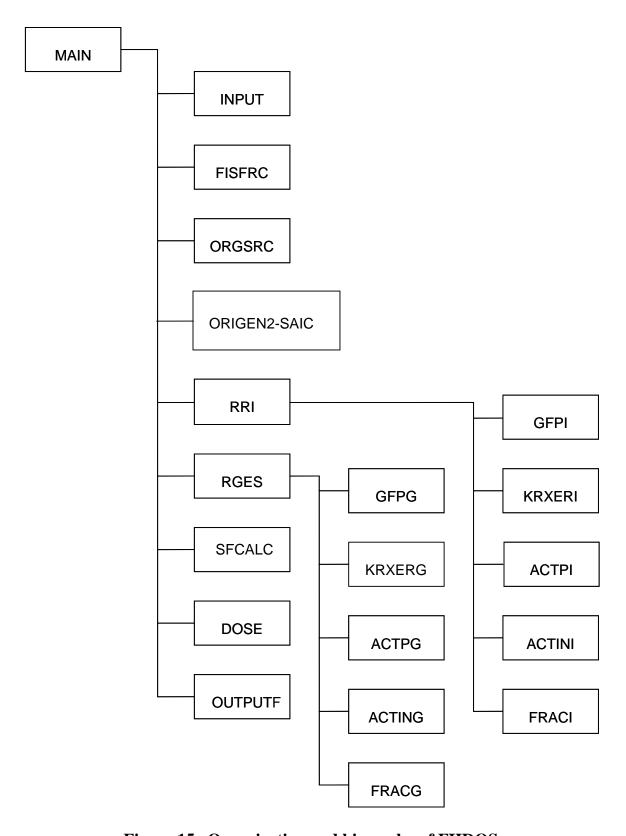


Figure 15. Organization and hierarchy of FIIDOS.

Subroutine ACTPI accepts the relative radionuclide inventory of activation products calculated by ORIGEN2-SAIC, if required.

Subroutine ACTINI accepts the relative radionuclide inventory of actinide elements products calculated by ORIGEN2-SAIC, if required.

Subroutine FRACI is used to calculate the change in the relative radionuclide inventory of fission products resulting from fractionation, if required. This calculation uses radionuclide-specific fractionation factors provided by the user and radionuclide inventory data produced by subroutine GFPI.

Subroutine RGES calculates the relative gamma-ray emission spectrum of a mixture of radionuclides at the measurement time, if required. Subroutine RGES itself is primarily a control module; as shown in Figure 15, subroutine RGES has five subordinate modules that perform the spectrum-related calculations.

Subroutine GFPG accepts the relative gamma-ray emission spectrum from the fission product radionuclides, calculated by ORIGEN2-SAIC, considering the contribution from each fissionable material-neutron energy set.

Subroutine KRXERG determines the relative gamma-ray emission spectrum contributed by the krypton and xenon radionuclides removed from the fission product inventory, if required. This calculation uses gamma-ray emission spectral data contained in a data file and radionuclide inventory data produced by subroutine KRXERI.

Subroutine ACTPG accepts the relative gamma-ray emission spectrum contributed by the activation products, calculated by ORIGEN2-SAIC, if required.

Subroutine ACTING accepts the relative gamma-ray emission spectrum contributed by the actinide elements calculated by ORIGEN2-SAIC, if required.

Subroutine FRACG is used to calculate the change in the relative gamma-ray emission spectrum of fission products resulting from fractionation, if required. This calculation uses gamma-ray emission spectral data provided by the user and radionuclide inventory data produced by subroutine FRACI.

Subroutine SFCALC calculates the radiological contamination scaling factor based on the radiological measurement data provided by the user. As appropriate, this scaling factor is the intake, airborne concentration, or surface concentration of the radioactive material.

Subroutine DOSE calculates the radiation dose to each organ contributed by each radionuclide and performs the plutonium excretion calculations, if requested.

Subroutine OUTPUTF provides the calculated doses and other elements of calculation data. A discussion of the program output is in Section 3.6.

Subroutine ORIGEN2-SAIC is called by the main routine to calculate inventory and spectra at times of interest. More information on this code is available (Croff, 1980; Roberts, 1996).

#### 3.4 DATA LIBRARY

FIIDOS makes extensive use of files stored in a data library to provide problem-independent input data. Table 12 identifies the FIIDOS data library files. FIIDOS causes ORIGEN2-SAIC to calculate the decay inventory and spectra at 40 basic times after detonation. The 40 times are given in Table 13.

The gamma-ray emission spectra are calculated for 18 energy groups by ORIGEN2-SAIC. The gamma-ray release rate is expressed in terms of gamma-rays per second and is based on 10<sup>14</sup> fissions. Table 14 provides the 18 gamma-ray energy groups. The files KRXE.GAM, contain gamma-ray emission spectra for krypton and xenon radionuclides. The spectra are expressed in gamma rays per disintegration and are provided in the 18-energy group structure given above.

The files GREF.SUR, GREF.INC, and GREF.BLC contain the gamma-ray exposure factor for radiation intensity above a contaminated surface, inside a debris cloud, and at the surface below a debris cloud, respectively. In the file GREF.SUR the factors are given in units of rad hr<sup>-1</sup>, R hr<sup>-1</sup>, or rem hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup> cm<sup>-2</sup> and factors are provided for several detector-orientation combinations. In the files GREF.INC and GREF.BLC the factors are given in units of R hr<sup>-1</sup> per  $\gamma$  hr<sup>-1</sup> cm<sup>-2</sup> and factors are provided for a single detector-orientation combination. The factors are represented in the 21-energy group structure given in Table 15.

The files INH.DCF and ING.DCF contain the ingestion and inhalation dose conversion factors. The factors are given in units of rem  $\mu \text{Ci}^{-1}$ .

#### 3.5 INPUT DESCRIPTION

The user-supplied, problem-dependent input data required by the computer code FIIDOS is identified in Table 16. A discussion of this input data, keyed to the entries in Table 16, is provided below.

#### 3.6 OUTPUT DESCRIPTION

The computer code FIIDOS has two basic types of output: standard and optional. Standard output, which provides the basic dose results of a FIIDOS calculation, occurs automatically and is not under any form of user control. Optional output, which provides supplemental information on the details of the FIIDOS calculations, is permitted or suppressed by user-specified control parameters.

Table 12. FIIDOS data library.

# FIIDOS data files

Unit Numb	er File Name	File Contents
1	fiidos.out	FIIDOS output
2	inh.dcf	Inhalation Dose Conversion Factors (ICRP-72)
2	ing.dcf	Ingestion Dose Conversion Factors (ICRP-72)
2	input.dat	FIIDOS input file
2	krxe.gam	Gamma-ray Emission Spectrum for Krypton and Xenon
		Radionuclides
2	gref.sur	Gamma-ray Exposure Factor above Contaminated Surface
2	gref.inc	Gamma-ray Exposure Factor Aloft inside Debris Cloud
2	gref.blc	Gamma-ray Exposure Factor at Surface inside Debris Cloud
2	tape5.inp	ORIGEN2-SAIC input file created by subroutine orgsrc.ftn
3	orgsrc.dat	Initial 1 msec fission product inventory for U-235, U-238,
		Pu-239; fast & 14 MeV
2 & :	3 frac.gam	Gamma-ray Emission Spectrum for Fractionated Fission
		Products (user supplied)

# ORIGEN2-SAIC data files

Unit Number	File Name	File Contents
3	tape3.inp	(not used) substitute library cards
4	tape4.inp	(not used)
5	tape5.inp	ORIGEN2-SAIC input file
6	tape6.out	ORIGEN2-SAIC output file
7	tape7.out	(not used) punch output
9	tape9.inp	decay library
10	tape10.inp	gamma-ray library
11	tape11.out	alternative output file
12	tape12.out	table of contents for tape6.out
13	tape13.out	(not used)table of contents for tape11.out
15	tape15.out	debugging file
16	tape16.out	info on variable actinide cross sections
50	tape50.out	copy of tape5.inp

Table 13. The 40 basic time intervals that ORIGEN2-SAIC used when performing the decay calculations.

<u>Interval</u>	Seconds	Seconds I	Hours	Days	Years
1	$1.00 \times 10^{-3}$				
2	$2.15 \times 10^{-3}$				
3	$4.64 \times 10^{-3}$				
4	$1.00 \times 10^{-2}$				
5	$2.15 \times 10^{-2}$				
6	$4.64 \times 10^{-2}$	0.05			
7	$1.00 \times 10^{-1}$	0.10			
8	$2.15 \times 10^{-1}$	0.22			
9	$4.64 \times 10^{-1}$	0.46			
10	$1.00 \times 10^{0}$	1.00			
11	$2.15 \times 10^{0}$	2.15			
12	$4.64 \times 10^{0}$	4.64			
13	$1.00 \times 10^{1}$	10.00			
14	$2.15 \times 10^{1}$	21.54			
15	$4.64 \times 10^{1}$	46.42			
16	$1.00 \times 10^{9}$	100.00			
17	$2.15 \times 10^{9}$	215.40	0.06		
18	$4.64 \times 10^{9}$	464.20	0.13		
19	$1.00 \times 10^{9}$	1000.0	0.28		
20	$2.15 \times 10^{9}$		0.60		
21	$4.64 \times 10^{9}$		1.29	0.05	
22	$1.00 \times 10^{9}$		2.78	0.12	
23	$2.15 \times 10^{9}$		5.98	0.25	
24	$4.64 \times 10^{9}$		12.89	0.54	
25	$1.00 \times 10^{9}$	4	27.78	1.16	
26	$2.15 \times 10^{9}$			2.49	
27	$4.64 \times 10^{9}$			5.37	
28	$1.00 \times 10^{9}$			11.57	
29	$2.15 \times 10^{9}$			24.93	0.07
30	$4.64 \times 10^{9}$			53.73	0.15
31	$1.00 \times 10^{9}$			115.7	0.32
32	$2.15 \times 10^{9}$			249.3	0.68
33	$4.64 \times 10^{9}$			537.2	1.47
34	$1.00 \times 10^{9}$				3.17
35	$2.15 \times 10^{9}$				6.83
36	$4.64 \times 10^{9}$				14.72
37	$1.00 \times 10^{9}$				31.71
38	$2.15 \times 10^{9}$				68.30
39	$4.64 \times 10^{9}$				147.2
40	$1.00 \times 10^{10}$				317.1

Table 14. Eighteen energy groups for gamma-ray spectra with their midpoint energies noted.

Group	$\underline{E}_{mid}(MeV)$	<u>Group</u>	$E_{mid}(MeV)$	<u>Group</u>	$\underline{E}_{mid}(MeV)$
1	0.010	7	0.225	13	2.25
2	0.025	8	0.375	14	2.75
3	0.0375	9	0.575	15	3.50
4	0.0575	10	0.850	16	5.00
5	0.0850	11	1.25	17	7.00
6	0.125	12	1.75	18	9.50

Table 15. Twenty one energy groups for gamma-ray exposure factors spectra with their midpoint energies noted.

<u>Group</u>	$E_{mid}(MeV)$	<u>Group</u>	$E_{mid}(MeV)$	<u>Group</u>	$\underline{E}_{mid}(MeV)$
1	14.0	8	3.0	15	0.3
2	10.0	9	2.5	16	0.15
3	8.0	10	2.0	17	0.1
4	7.0	11	1.5	18	0.07
5	6.0	12	1.0	19	0.045
6	5.0	13	0.7	20	0.03
7	4.0	14	0.45	21	0.02

# Table 16. Input data required by FIIDOS.

- 1. Title
- 2. Index for Type of Problem
- 3. First Index for Output Control
- 4. Second Index for Output Control
- 5. Third Index for Output Control
- 6. Fourth Index for Output Control
- 7. Fifth Index for Output Control
- 8. Number of Measurements
- 9. Types of Radiological Measurements
- 10. Times at which Radiological Measurements are Performed
- 11. Measured Radiation Intensities
- 12. Types of Radiation Intensity Measurement Devices
- 13. Measured Gross Activities
- 14. Number of Exposure Incidents
- 15. Times at which the Exposures Occurred
- 16. Measurement Correspondences of Exposures
- 17. Durations of the Exposures
- 18. Breathing Rates During the Exposures
- 19. Ratios of Airborne to Surface Activity during the Exposures
- 20. Types of Dose Conversion Factors for Exposures
- 21. Fissile Yields for Fission Products
- 22. Index for Activation Products
- 23. Activation Product Yields
- 24. Index for Actinides
- 25. Actinide Yields
- 26. Index for Krypton and Xenon
- 27. Index for Fractionation of Fission Products
- 28. Number of Fission Product Radionuclides to be Modified by Fractionation
- 29. Identification Numbers of Fractionated Fission Products
- 30. Remaining Fractions of Fission Product Inventory
- 31. Gamma-ray Emission Spectrum for Fractionated Fission Products
- 32. Index for Plutonium Excretion
- 33. Number of Times to Calculate Pu-239 Excretion
- 34. User Specified Times for Pu-239 Urine Excretion

# Table 16. Input data required by FIIDOS (Continued).

(1) Item: Title

Name: TITLE(I)

Remarks: Title of problem selected by user.

(2) Item: Index for Type of Problem

Name: ITPM

Remarks: The index parameter ITPM may have the integer value of 1 or 2.

The following scheme is used:

Value Type of Problem

1 Short (Acute) Exposures (up to 100 measurement plus exposure

times)

2 Long Duration (Integrated) Exposures (up to 33 long duration

integrations)

(3) Item: First Index for Output Control

Name: IOUT1

Remarks: The index parameter IOUT1 may have the integer value of 0 or 1. If

IOUT1 = 0, this output option is not used. If IOUT1 = 1, either the relative gamma-ray emission spectrum at the time of measurement

or the measured activity of radiological material, and the

radiological contamination scaling factor are provided as code

output.

(4) Item: Second Index for Output Control

Name: IOUT2

Remarks: The index parameter IOUT2 may have the integer value of 0 or 1. If

IOUT2 = 0, this output option is not used. If IOUT2 = 1, the relative radionuclide inventories for fission products, activation products, and actinide elements, at the time of exposure, are provided as code

output. Suppressed for ITPM=2.

(5) Item: Third Index for Output Control

Name: IOUT3

Remarks: The index parameter IOUT3 may have the integer value of 0 or 1. If

IOUT3 = 0, this output option is not used. If IOUT3 = 1, the dose to

each organ from each radionuclide is provided as code output.

Suppressed for ITPM=2.

# Table 16. Input data required by FIIDOS (Continued).

(6) Item: Fourth Index for Output Control

Name: IOUT4

Remarks: The index parameter IOUT4 may have the integer value of 0 or 1. If

OUT4 = 0, only the total dose from all exposures is printed in the output file. If IOUT4 = 1, the intermediate doses corresponding to each exposure are printed. If IOUT4 = 0, output for IOUT1, IOUT2,

and IOUT3 is suppressed.

(7) Item: Fifth Index for Output Control

Name: IOUT5

Remarks: The index parameter IOUT5 may have the integer value of 0 or 1. If

IOUT5 = 0, this output option is not used. If IOUT5 = 1, a summary dose table is create in a separate file (FIIDOST.OUT) with dose contributions by exposure as well as by source (alpha emitters and beta plus gamma emitters). This option is ideal for creating dose

lookup tables to be imported into spreadsheet programs.

(8) Item: Number of Radiological Measurements

Name: NMEAS

Remarks: For ITPM = 1, the parameter NMEAS may have an integer value

between 1 and 99, with the additional requirement that NMEAS +  $NEXP \le 100$ . For ITPM = 2, NMEAS may have an integer value between 1 and 33. FIIDOS will ignore measurements that do not

have corresponding exposures.

\*\*\* Data items 9, 10, 11, 12, and 13 are entered in sequence for each measurement \*\*\*

(9) Item: Types of Radiological Measurements
Name: XITRM (NMEAS entries required)

Remarks: The index parameter XITRM(I) may have the integer value of 1, 2,

3, 4, 5, or 6.

The following scheme is used:

Value Type of Radiological Measurement
1 Radiation Intensity - Above Contam. Surface

2 Radiation Intensity - Inside Debris Cloud

Radiation Intensity - Below Debris Cloud

Gross Activity - Airborne Concentration
 Gross Activity - Surface Concentration

6 Gross Activity - Ingestion or Inhalation Intake (if XRIMES(I)  $\neq$  0;

indicates Specific Activity Intake)

# Table 16. Input data required by FIIDOS (Continued).

(10) Item: Times at which Radiological Measurements are Performed

Name: XTMEAS (NMEAS entries required)

Remarks: This time is referenced to the time of the nuclear explosion and is

given in units of hours.

(11) Item: Measured Radiation Intensities

Name: XRIMES (NMEAS entries required)

Remarks: If corresponding XITRM = 1, enter the radiation measurement in

rad  $hr^{-1}$ ,  $R hr^{-1}$ , or rem  $hr^{-1}$ . If XITRM = 2 or 3, enter the radiation intensity (R/hr). If XITRM = 4, or 5, enter a zero. If XITRM = 6, enter a zero for gross activity intake, or enter FIIDOS isotope # for

specific activity intake for that isotope).

(12) Item: Types of Radiation Intensity Measurement Devices

Name: XITMI (NMEAS entries required)

Remarks: If corresponding XITRM = 1, enter the integer value of 1, 2, 3, 4, or

5.

The following scheme is used:

Value	Type of Measurement Device
1	Tissue, Free-In-Air

1 Tissue, Free-In-A 2 Air, Free-In-Air

Film Badge, Free-In-Air

Film Badge, In-Situ (Midplane)
Film Badge, In-Situ (Isotropic)

If XITRM = 2 or 3, enter 2.

If XITRM = 4, 5, or 6, enter zero.

(13) Item: Measured Gross Activities

Name: ACTMES (NMEAS entries required)

Remarks: If corresponding XITRM = 1, 2, or 3, enter a zero. If XITRM = 4, 5,

or 6, enter the measured gross activity in units of Ci-m<sup>3</sup>, Ci m<sup>-2</sup>, or

Ci, as appropriate.

(14) Item: Number of Exposure Incidents

Name: NEXP

Remarks: If ITPM = 1, up to 99 exposure incidents can be calculated, with the

additional requirement that NMEAS + NEXP 100. If ITPM = 2, up

to 33 exposure incidents can be entered.

## Table 16. Input data required by FIIDOS (Continued).

\*\*\* Data items 15, 16, 17, 18, 19 and 20 are entered in sequence for each exposure \*\*\*

(15) Item: Times at which Exposures Occurred

Name: XTEXP (NEXP entries required)

Remarks: This time is referenced to the time of the nuclear explosion and is

given in units of hours.

(16) Item: Measurement Correspondences of Exposures

Name: XCMEAS (NEXP entries required)

Remarks: This index determines the measurement time corresponding to the

exposure.

The following scheme is used:

Value Types of Measurement Correspondence

Nearest measurement time after exposure

Nearest measurement time prior to exposure

Exposure corresponds to #th measurement

(17) Item: Durations of Exposures

Name: XDUR (NEXP entries required)

Remarks: This duration is given in units of hours. If corresponding XITRM =

6, enter 10.

(18) Item: Breathing Rates during Exposures

Name: XBR (NEXP entries required)

Remarks: The breathing rate is given in units of m<sup>3</sup> hr<sup>-1</sup>. If corresponding

XITRM = 6, enter the value 1.0.

(19) Item: Ratios of Airborne to Surface Activity during Exposures

Name: XKFAC (NEXP entries required)

Remarks: If corresponding XITRM = 1 or 5, enter the ratio in units of  $m^{-1}$ . If

XITRM = 2, 3, 4, or 6, enter the value 1.0.

(20) Item: Types of Dose Conversion Factor during Exposures

Name: ITDCF (NEXP entries required)

Remarks: The index parameter ITDCF may have the integer value of 1 or 2.

The following scheme is used.

Value Dose Conversion Factor

Inhalation (currently ICRP-72)Ingestion (currently ICRP-72)

## Table 16. Input data required by FIIDOS (Continued).

(21) Item: Fissile Yields from Fissionable Material-Neutron Energy Set

Name: YKT (6 entries required)

Remarks: Enter the weapon yield in kilotons from one of the two options.

<u>I</u>	FIIDOS option 1	FIIDOS option 2
	Fission/Fusion Yields	Fission by Neutron Energy
1	-1	U-235, Fast Neutron
2	Total Yield	U-235, 14-MeV Neutron
3	Total U-235 Yield	U-238, Fast Neutron
4	Total U-238 Yield	U-238, 14-MeV Neutron
5	Total Pu-239 Yield	Pu-239, Fast Neutron
6	Total Fusion yield (for yield balance)	Pu-239, 14-MeV Neutron

(22) Item: Index for Activation Products

Name: IACTP

Remarks: The index parameter IACTP may have the integer value of 0 or 1. If

IACTP = 0, activation products are not considered. If IACTP = 1,

activation products are considered.

(23) Item: Activation Product Production

Name: ACTPP (20 entries required if IACTP=1)

Remarks: If IACTP = 0, this data is not required. If IACTP = 1, enter the

production data, in units of Ci kT-1, for 20 specific radionuclides in

the following order.

(1) Be-7 (2) Na-24 (3) Mn-54 (4) Fe-55 (5) Fe-59 (6) Co-57 (7) Co-58 (8) Co-60

(9) Cu-64 (10) Cu-67 (11) W-181 (12) W-185

(13) W-187 (14) W-188 (15) Au-198 (16) Au-199

(17) Pb-203 (18) Not used (19) Not used (20) Not used

(24) Item: Index for Actinides

Name: IACTIN

Remarks: The index parameter IACTIN may have the integer value of 0 or 1.

If IACTIN = 0, actinide elements are not considered. If IACTIN =

1, actinide elements are considered.

# Table 16. Input data required by FIIDOS (Continued).

(25) Item: Actinide Production

Name: ACTINP (20 entries required if IACTP=1)

Remarks: If IACTIN = 0, this data is not required. If IACTIN = 1, enter the

production data, in units of Ci kT<sup>-1</sup>, for 20 specific radionuclides in

(4) U-233

the following order:

(1) Th-229 (2) Th-230 (3) Th-234

(5) U-234 (6) U-235 (7) U-237 (8) U-238

(9) U-240 (10) Np-237 (11) Np-239 (12) Np-240

(13) Pu-238 (14) Pu-239 (15) Pu-240 (16) Pu-241

(17) Am-241 (18) Cm-242 (19) Not used (20) Not used

(26) Item: Index for Krypton and Xenon

Name: IKRXER

Remarks: The index parameter IKRXER may have the integer value of 0 or 1.

If IKRXER=0, the fission product inventory is not modified. If IKRXER = 1, krypton and xenon radionuclides are removed from

the fission product inventory.

(27) Item: Index for Fractionation of Fission Products

Name: IFRAC

Remarks: The index parameter IFRAC may have the integer value of 0 or 1. If

IFRAC = 0, the fission product inventory is not modified. If IFRAC = 1, the fission product inventory is modified to reflect fractionation

effects.

(28) Item: Number of Fission Product Radionuclides to be Modified by

Fractionation

Name: NFRAC

Remarks: If IFRAC = 0, this entry is not required. If IFRAC = 1, enter the

number of radionuclides to be considered.

\*\*\*Data Items 29, 30, and 31 are entered in sequence for each radionuclide\*\*\*

(29) Item: Identification Numbers of Fractionated Fission Products

Name: IDFRAC (NFRAC entries required if IFRAC=1)

Remarks: If IFRAC = 0, this data is not required. If IFRAC = 1, enter the

identification number for each fractionated fission product using the

identification numbers given below.

Table 16. Input data required by FIIDOS (Continued).

(1)	SE-79	(2)	BR-82	(3)	BR-83	(4)	KR-83M	(5)	BR-84
(6)	BR-85	(7)	KR-85	(8)	KR-85M	(9)	RB-86	(10)	KR-87
(11)	RB-87	(12)	KR-88	(13)	RB-88	(14)	KR-89	(15)	RB-89
(16)	SR-89	(17)	RB-90	(18)	RB-90M	(19)	SR-90	(20)	Y-90
(21)	RB-91	(22)	SR-91	(23)	Y-91	(24)	Y-91M	(25)	SR-92
(26)	Y-92	(27)	SR-93	(28)	Y-93	(29)	ZR-93	(30)	NB-93M
(31)	Y-94	(32)	Y-95	(33)	ZR-95	(34)	NB-95	(35)	Y-96
(36)	ZR-97	(37)	NB-97	(38)	NB-97M	(39)	NB-98M	(40)	MO-99
(41)	TC-99	(42)	TC-99M	(43)	MD-101	(44)	TC-101	(45)	MO-102
(46)	TC-102	(47)	TC-103	(48)	RU-103	(49)	RH-103M	(50)	TC-104
(51)	MO-105	(52)	TC-106	(53)	RU-105	(54)	RH-105	(55)	RH-105M
(56)	RU-106	(57)	RH-106	(58)	PD-107	(59)	RH-109	(60)	PD-109
(61)	AG-109M	I(62)	AG-110M	I(63)	AG-111	(64)	CD-113M	(65)	CD-115M
(66)	SN-123	(67)	SB-124	(68)	SN-125	(69)	SB-125	(70)	TE-125M
(71)	SN-126	(72)	SB-126	(73)	SB-127	(74)	TE-127	(75)	TE-127M
(76)	SB-129	(77)	TE-129	(78)	TE-129M	(79)	I-129	(80)	SN-130
(81)	SB-130M	(82)	I-130	(83)	SB-131	(84)	TE-131	(85)	TE-131M
(86)	I-131	(87)	XE-131M	(88)	SB-132	(89)	SB-132M	(90)	TE-132
(91)	I-132	(92)	SB-133	(93)	TE-133	(94)	TE-133M	(95)	I-133
(96)	XE-133	(97)	XE-133M	(98)	TE-134	(99)	I-134	(100)	CS-134
(101)	CS-134M	(102)	I-135	(103)	XE-135	(104)	XE-135M	(105)	CS-135
(106)	CS-136	(107)	XE-137	(108)	CS-137	(109)	BA-137M	(110)	XE-138
(111)	CS-138	(112)	CS-139	(113)	BA-139	(114)	CS-140	(115)	BA-140
(116)	LA-140	(117)	BA-141	(118)	LA-141	(119)	CE-141	(120)	BA-142
(121)	LA-142	(122)	LA-143	(123)	CE-143	(124)	PR-143	(125)	CE-144
(126)	PR-144	(127)	PR-144M	(128)	CE-145	(129)	PR-145	(130)	CE-146
(131)	PR-146	(132)	CE-147	(133)	PR-147	(134)	ND-147	(135)	PM-147
(136)	PR-148	(137)	PM-148	(138)	PM-148M	(139)	PM-149	(140)	PM-151
(141)	SM-151	(142)	EU-152	(143)	SM-153	(144)	EU-154	(145)	EU-155
(146)	EU-156	(147)	TB-160	(148)	HO-166M	(149)	NOT USED	(150)	NOT USED

(30) Item: Remaining Fractions of Fission Product Inventory
Name: FFRAC (NFRAC entries required if IFRAC=1)
Remarks: If IFRAC = 0, this data is not required. If IFRAC=

If IFRAC = 0, this data is not required. If IFRAC = 1, enter the fraction of the basic fission product inventory that is present in the fractionated fallout material which corresponds to each identified

fission product.

## Table 16. Input data required by FIIDOS (Concluded).

(31) Item: Gamma-ray Emission Spectrum for Fractionated Fission Products

Name: GAMMA (18 entries for each NFRAC fission products, required if

IFRAC = 1

Remarks: If IFRAC = 0, this data is not required. If IFRAC = 1, enter the

gamma-ray emission spectrum in units of γ sec<sup>-1</sup> Ci<sup>-1</sup> in the

ORIGEN2 18-energy group structure which corresponds to each

identified fission product.

(32) Item: Index for Plutonium Excretion

Name: IPLUT

Remarks: The index parameter IPLUT may have the integer value of 0 or 1. If

IPLUT = 0, the plutonium excretion calculations are not included in the program output. If IPLUT = 1, plutonium excretion calculation is done for each exposure, with all times normalized to the shot time.

(33) Item: Number of Times to Calculate Pu-239 Excretion

Name: NPLUT

Remarks: The maximum value for NPLUT is 10. This data is not required if

IPLUT = 0.

(34) Item: User Specified Times for Pu-239 Excretion

Name: TYRS (NPLUT entries required if IPLUT=1)

Remarks: FIIDOS normalizes all excretions to the shot time so that excretions

from multiple exposures may be added for a total excretion value

from all exposures. This data is not required if IPLUT = 0.

Standard FIIDOS output includes the user-supplied input data and the total calculated organ doses. The input data produced include the data given in Table 16. The calculated doses for each organ include the doses from fission products, activation products, and actinide elements and the total dose from all radionuclides. If specified in the input file, the Pu-239 urine excretion amounts are included in the output for the specified times.

Optional FIIDOS outputs include five separate options under user control:

- first option provides details on the radiological contamination scaling factor, including, as appropriate, either the relative gamma-ray emission spectrum at the time of measurement or the measured activity of radiological material;
- second option produces a listing of the relative radiological inventories for fission products, activation products, and actinide elements, at the time of exposure;
- third option produces a listing of the dose to each organ from each radionuclide;
- fourth option indicates whether the intermediate results from multiple exposure will be produced; and,
- fifth option produces a secondary output file in tabular format with all the intermediate and total doses, convenient for importing into a spreadsheet application for further processing.

If no intermediate results are requested, the output from the first three options is suppressed.

The collective output provided by FIIDOS when all four options pertaining to the main output file are exercised is shown in Figure 16. The example problem is illustrated in Figure 16 is a 15-minute inhalation exposure to depleted fallout 4 hours after the detonation. This fallout scenario is characterized by a radiation intensity of 10 R hr<sup>-1</sup> at H+1 hour. The weapon yield is 10 kT, all from U-235 fast fission. No activation products or actinides are considered. The fallout is considered to be depleted of the fission gases krypton and xenon, but no other fractionation effects are considered. The secondary file output from this run is not reproduced herein.

fiidos input

title:	FIIDOS VERSION 4.3 EX	AMPLE PROBLEM ONE				
itpm	problem type s:	ingle/integrated	1/2	1		
	print spectrum					
iout2	print inventory	no/ves	0/1	1		
iout3	print dose inventory	no/yes	0/1	1		
iout4	print intermediate doses	no/yes	0/1	1		
iout5	print dose tables	no/yes	0/1	1		
nmeas	number of measurement calc	culations		1		
itrm	rad measurement indices			1		
tmeas	time of rad measurements			1.00		
rimes	rad intensity (itrm=1-3);	index nuclide (it	rm=6)	10.0		
itmi			:/5	2		
actmes	activity measurement (itr		0.00			
nexp	number of exposure calcula	ations		1		
texp	exposed @ h+(hr)			4.00		
	rad exposure to measuremen	nt indices (re-sor	ted)	1		
dur	duration (hr)			0.250		
br	breathing rate (m**3/hr)			1.20		
	resuspension factors (m**-	,		1.000E-05		
itdcf	dose conversion factor set	t index 1/2		1		
iactp	activation products	no/yes	0/1	0		
	actinides	no/yes	0/1	0		
ikrxer	noble gases removed	0/1	1			
			0/1	0		
iplut	plutonium bioassay	no/yes	0/1	1		
	number of entries for plut			3		
tyrs	times after shot for Pu co		50.0	55.0	60.0	

#### fiidos output

time of measurement 1.00 hours spec(j)-relative gamma emission spectrum at time of measurement (gamma/hr per 10\*\*14 fissions)

group #	fission product	activation product	actinides	total	noble gases	fractionated
1	4.140E+11	0.00	0.00	4.140E+11	1.260E+11	0.00
2	1.444E+12	0.00	0.00	1.444E+12	3.149E+10	0.00
3	1.096E+12	0.00	0.00	1.096E+12	3.453E+10	0.00
4	7.883E+10	0.00	0.00	7.883E+10	5.261E+08	0.00
5	7.442E+11	0.00	0.00	7.442E+11	2.103E+08	0.00
6	1.790E+12	0.00	0.00	1.790E+12	2.686E+09	0.00
7	4.983E+12	0.00	0.00	4.983E+12	7.058E+11	0.00
8	6.026E+12	0.00	0.00	6.026E+12	7.673E+11	0.00
9	8.902E+12	0.00	0.00	8.902E+12	1.444E+11	0.00

Figure 16. FIIDOS output - all options.

10 11 12 13 14 15 16 17	1.840 9.412 3.465 4.501 5.65 0.00	E+12 E+12 E+12 E+11 E+11 E+09	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		1.320E+13 9.872E+12 2.386E+12 1.840E+12 9.412E+11 3.465E+11 4.501E+09 5.65 0.00	2.120 1.021 2.961 6.322 1.060 3.973 7.963 0.00	E+11 E+11 E+11 DE+11 BE+09 BE+05	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0			
invent					lucts, 20 act				_			
0 10 20	1 1.541E-12 2.724E-17 0.00 1.545E-05 1.951E-13 0.00 2.590E-05 5.087E-13 0.00 2.405E-04 2.012E-08 6.272E-04 3.458E-03 8.768E-05 2.353E-10 0.00 0.00 0.00 0.00	2 2.429E-08 0.00 2.357E-03 2.599E-08 1.435E-04 1.632E-11 1.668E-13 2.456E-09 3.657E-08 3.688E-30 3.235E-03 3.235E-03 0.00 7.886E-17 0.00 0.00 0.00 0.00	3 4.277E-04 2.697E-03 4.521E-06 2.182E-05 1.271E-06 7.627E-04 1.208E-06 1.507E-05 2.825E-05 2.152E-04 0.00 3.704E-03 8.401E-04 2.565E-07 1.711E-05 0.00 0.00 0.00 0.00	4 0.00 0.00 1.425E-03 6.677E-08 1.273E-05 7.446E-05 8.930E-12 2.847E-06 2.553E-04 9.516E-04 0.00 0.00 6.766E-06 4.171E-05 9.328E-14 0.00 0.00 0.00	5 6.631E-05 2.019E-06 4.043E-03 0.00 4.907E-08 2.172E-04 5.693E-09 2.488E-09 7.629E-05 1.475E-03 1.029E-13 1.011E-04 4.031E-06 4.610E-09 5.155E-09 0.00 0.00 0.00	6 6.437E-27 1.902E-05 3.582E-03 1.588E-03 4.946E-08 3.118E-07 2.340E-09 4.143E-04 7.388E-05 0.00 2.441E-07 6.867E-06 4.025E-06 5.690E-33 7.433E-08 0.00 0.00 0.00 0.00	7 0.00 8.465E-20 4.910E-11 1.503E-03 0.00 3.118E-07 1.151E-11 4.019E-04 0.00 0.00 0.00 1.140E-05 5.648E-08 1.301E-11 2.476E-13 0.00 0.00 0.00 0.00	8 0.00 1.498E-18 2.493E-03 1.507E-03 1.795E-05 2.536E-14 1.526E-07 1.248E-06 5.924E-19 8.914E-04 1.250E-07 4.208E-03 4.559E-25 4.658E-12 2.434E-19 0.00 0.00 0.00 0.00	9 1.082E-09 1.151E-07 5.629E-13 2.669E-06 1.696E-05 0.00 1.035E-08 8.066E-15 3.320E-27 4.685E-03 1.180E-07 1.835E-05 2.094E-03 7.830E-05 0.00 0.00 0.00 0.00 0.00	10 0.00 5.839E-09 5.736E-17 4.352E-04 4.234E-06 2.590E-05 4.545E-12 1.752E-21 2.983E-04 1.356E-11 0.00 2.460E-08 3.084E-07 6.924E-05 0.00 0.00 0.00 0.00		
	acttot to			*14 fissions		5.214E-02						
iso # 1 2 3 4 5 6 7 8 9 10 11 12 13	adrenals 6.518E-15 1.781E-10 4.825E-08 0.00 8.977E-09 0.00 0.00 3.357E-11 0.00 4.303E-19 0.00 1.749E-07	bone surf 6.518E-15 1.713E-10 4.825E-08 0.00 9.351E-09 0.00 0.00 1.221E-10 0.00 1.690E-18 0.00 1.977E-07	brain 6.518E-15 1.439E-10 4.825E-08 0.00 9.351E-09 0.00 0.00 3.357E-11 0.00 4.303E-19 0.00 1.825E-07	breast 6.518E-15 1.439E-10 4.825E-08 0.00 7.855E-09 0.00 0.00 3.052E-11 0.00 4.303E-19 0.00 1.673E-07	st wall 7.822E-15 2.466E-10 1.206E-06 0.00 3.553E-07 0.00 0.00 3.662E-11 0.00 4.533E-19 0.00 8.366E-06	si wall 9.125E-15 1.850E-10 6.514E-08 0.00 1.309E-08 0.00 0.00 0.00 3.357E-11 0.00 4.303E-19 0.00 3.575E-07	uli wall 2.303E-14 2.329E-10 7.840E-08 0.00 1.010E-08 0.00 0.00 4.578E-11 0.00 6.147E-19 0.00 2.053E-07	lli wall 5.649E-14 2.877E-10 5.910E-08 0.00 7.668E-09 0.00 0.00 7.019E-11 0.00 9.988E-19 0.00 1.673E-07	kidneys 2.216E-13 1.507E-10 4.825E-08 0.00 8.416E-09 0.00 0.00 0.00 3.357E-11 0.00 4.303E-19 0.00 1.749E-07	liver 9.560E-14 1.644E-10 4.825E-08 0.00 8.229E-09 0.00 0.00 3.357E-11 0.00 4.303E-19 0.00 1.673E-07	et region 2.477E-13 1.028E-08 1.037E-05 0.00 1.795E-06 0.00 0.00 1.129E-10 0.00 1.844E-18 0.00 2.738E-05	lung 8.691E-13 1.987E-09 3.739E-06 0.00 2.244E-07 0.00 0.00 3.357E-11 0.00 4.533E-19 0.00 2.510E-06

Figure 16. FIIDOS output - all options (Continued).

14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	1.367E-10	2.050E-10	1.480E-10	1.196E-10	3.075E-09	1.765E-10	1.423E-10	1.310E-10	1.253E-10	1.196E-10	3.075E-08	1.480E-09
16	1.234E-07	3.755E-06	1.234E-07	1.234E-07	1.931E-07	2.414E-07	1.180E-06	3.165E-06	1.234E-07	1.234E-07	1.234E-06	1.395E-07
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	2.532E-09	1.558E-06	2.532E-09	2.532E-09	2.662E-09	2.792E-09	8.766E-09	2.500E-08	2.532E-09	2.532E-09	1.007E-08	2.630E-09
20	8.399E-15	2.470E-13	8.399E-15	8.399E-15	7.081E-11	1.647E-10	9.058E-10	2.141E-09	8.399E-15	2.470E-13	3.623E-10	1.285E-09
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	2.459E-06	1.196E-05	2.459E-06	1.861E-06	1.263E-05	1.861E-05	5.516E-05	5.849E-05	2.526E-06	2.260E-06	2.526E-04	4.519E-06
23	6.120E-10	8.032E-09	2.040E-10	6.629E-10	3.825E-08	9.562E-08	5.737E-07	1.657E-06	3.442E-10	8.159E-09	8.159E-07	8.797E-06
24	5.628E-08	4.422E-08	3.939E-08	3.618E-08	6.432E-07	3.055E-07	3.939E-07	3.899E-07	5.628E-08	4.824E-08	1.085E-05	2.010E-06
25	2.394E-06	1.368E-05	2.394E-06	1.938E-06	1.368E-05	2.508E-05	7.525E-05	5.359E-05	2.508E-06	2.280E-06	2.622E-04	5.701E-06
26	2.223E-07	2.021E-07	1.515E-07	1.616E-07	5.455E-05	7.577E-05	1.313E-04	6.466E-05	2.627E-07	2.324E-07	1.313E-04	7.072E-05
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	1.195E-07	1.336E-07	7.735E-08	9.141E-08	3.516E-05	6.961E-05	2.180E-04	2.391E-04	1.477E-07	1.477E-07	1.055E-04	1.125E-04
29	2.381E-16	7.938E-12	3.334E-16	1.175E-16	1.905E-16	4.763E-16	2.381E-15	6.985E-15	9.366E-17	7.938E-17	1.524E-14	4.604E-14
30	1.618E-20	8.735E-20	7.602E-21	1.618E-20	3.559E-20	6.955E-20	3.882E-19	1.132E-18	1.181E-19	1.601E-19	6.632E-18	2.265E-17
31	4.357E-10	3.791E-10	3.878E-10	3.355E-10	6.971E-08	1.786E-08	4.357E-09	5.228E-10	3.834E-10	3.311E-10	2.876E-07	3.616E-08
32	3.885E-13	3.079E-13	3.005E-13	3.592E-13	5.498E-11	8.063E-12	1.393E-12	4.618E-13	2.492E-13	3.005E-13	3.225E-10	3.738E-11
33	9.231E-07	8.001E-06	2.339E-07	7.385E-07	4.739E-07	4.862E-07	9.847E-07	2.154E-06	4.246E-07	6.154E-07	6.770E-06	1.969E-05
34	1.036E-09	5.272E-10	1.036E-10	1.092E-09	6.402E-10	7.155E-10	1.525E-09	3.201E-09	4.142E-10	9.226E-10	1.450E-08	2.260E-08
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	2.195E-06	3.808E-06	1.389E-06	1.702E-06	2.240E-05	5.824E-05	2.105E-04	3.001E-04	2.509E-06	2.419E-06	3.718E-04	1.613E-04
37	1.017E-07	8.053E-08	6.782E-08	6.782E-08	5.510E-06	4.111E-06	3.137E-06	6.782E-07	1.060E-07	8.901E-08	4.662E-05	8.477E-06
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	2.823E-07	3.068E-07	8.837E-08	2.577E-07	2.577E-06	6.382E-06	3.068E-05	7.119E-05	3.437E-07	3.927E-07	4.909E-05	7.978E-05
41	5.336E-17	5.336E-17	5.336E-17	5.336E-17	3.081E-15	6.602E-16	4.181E-15	1.210E-14	5.336E-17	7.152E-17	4.346E-14	1.870E-13
42	7.687E-09	1.376E-08	4.855E-09	4.855E-09	6.473E-08	8.496E-08	1.699E-07	1.173E-07	9.709E-09	8.496E-09	1.780E-06	3.762E-07
43	4.302E-11	3.944E-11	3.944E-11	3.227E-11	3.191E-09	8.605E-10	2.366E-10	3.944E-11	3.585E-11	3.227E-11	3.191E-08	3.550E-09
44	9.694E-11	1.005E-10	8.976E-11	7.181E-11	1.185E-08	2.262E-09	4.668E-10	7.540E-11	8.258E-11	7.540E-11	1.652E-07	1.580E-08
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	2.025E-07	8.607E-08	1.823E-08	2.025E-07	1.316E-07	1.772E-07	5.569E-07	1.468E-06	7.088E-08	1.671E-07	3.949E-06	1.114E-05
49 50	1.004E-12 2.150E-10	2.344E-12 1.911E-10	6.218E-13 1.911E-10	9.566E-13 1.672E-10	4.066E-09 1.791E-08	2.487E-09 4.180E-09	1.435E-09 1.146E-09	2.248E-10 2.030E-10	8.131E-13 1.911E-10	1.483E-12 1.672E-10	4.400E-09 9.195E-08	8.609E-09 8.956E-09
50 51	2.150E-10 0.00	0.00	0.00	0.00	0.00	4.180E-09 0.00	0.00	0.00	0.00	0.00	9.195E-08	0.00
51 52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	1.914E-07	1.850E-07	1.248E-07	1.355E-07	4.087E-06	6.238E-06	1.355E-05	1.140E-05	2.366E-07	2.065E-07	5.377E-05	1.957E-05
54	1.092E-08	1.113E-08	6.090E-09	9.030E-09	1.659E-07	3.780E-07	1.638E-06	3.150E-06	1.050E-07	1.113E-08	4.410E-06	5.460E-06
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	9.671E-09	4.748E-09	2.198E-09	9.671E-09	1.143E-08	1.846E-08	9.671E-08	2.901E-07	4.132E-09	8.089E-09	1.934E-07	4.660E-06
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	2.074E-20	3.075E-19	2.074E-20	2.074E-20	3.647E-18	9.296E-18	5.506E-17	1.645E-16	1.359E-17	7.151E-18	9.296E-17	3.432E-15
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	1.680E-10	6.208E-10	7.303E-11	1.461E-10	1.388E-07	2.921E-07	1.022E-06	1.388E-06	2.337E-09	1.315E-09	1.826E-06	1.826E-06
61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	4.185E-14	1.693E-14	3.433E-15	4.468E-14	2.304E-14	9.405E-15	1.505E-14	2.445E-14	1.552E-14	3.856E-14	1.505E-13	3.339E-13
63	2.181E-10	1.601E-10	8.178E-11	2.113E-10	5.793E-09	1.431E-08	8.178E-08	2.147E-07	1.431E-10	1.908E-09	1.056E-07	4.430E-07
64	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.540E-13	6.044E-13	9.066E-13	1.587E-12	8.562E-11	1.486E-11	1.058E-11	4.281E-11
65	1.429E-11	1.268E-11	1.188E-11	1.349E-11	6.101E-11	1.268E-10	6.903E-10	1.926E-09	1.766E-09	3.211E-10	9.151E-10	9.311E-09

Figure 16. FIIDOS output - all options (Continued).

66	7.920E-12	1.584E-10	7.260E-12	7.920E-12	2.244E-11	4.620E-11	2.574E-10	7.260E-10	7.260E-12	7.920E-12	4.290E-10	4.092E-09
67	4.546E-13	6.170E-13	7.469E-14	4.546E-13	3.182E-13	3.897E-13	1.266E-12	3.150E-12	2.013E-13	4.222E-13	5.845E-12	1.429E-11
68	3.961E-10	2.755E-09	1.507E-10	3.788E-10	1.894E-09	4.305E-09	2.368E-08	6.457E-08	2.497E-10	3.401E-10	2.152E-08	8.610E-08
69	3.504E-10	2.540E-09	8.468E-11	2.920E-10	2.015E-10	1.752E-10	3.796E-10	8.468E-10	1.606E-10	4.088E-10	3.212E-09	9.344E-09
70	6.153E-15	7.563E-13	2.564E-15	6.410E-15	1.038E-14	2.051E-14	1.013E-13	2.820E-13	3.077E-14	6.666E-15	7.948E-13	3.718E-12
71	1.148E-13	4.017E-13	5.452E-14	9.039E-14	6.887E-14	6.887E-14	1.420E-13	3.156E-13	6.600E-14	8.752E-14	5.452E-13	2.582E-12
72	5.471E-11	4.848E-11	1.108E-11	5.333E-11	5.125E-11	9.696E-11	2.424E-10	5.402E-10	2.701E-11	4.987E-11	1.662E-09	1.177E-09
73 74	3.399E-08 8.831E-11	5.949E-08	1.275E-08 8.831E-11	3.187E-08	1.062E-07 7.225E-09	2.635E-07	1.232E-06 3.934E-08	3.272E-06 4.094E-08	2.507E-08	4.079E-08 9.633E-11	3.442E-06 1.044E-07	5.099E-06 7.064E-08
7 <del>4</del> 75	4.280E-12	2.087E-10 7.016E-10	3.157E-11	8.831E-11 4.069E-12	7.225E-09 7.016E-12	1.284E-08 1.473E-11	1.123E-10	3.789E-10	2.729E-10 5.262E-11	4.069E-12	6.876E-10	4.139E-09
75 76	1.869E-07	2.453E-07	1.285E-07	1.402E-07	3.271E-06	6.075E-06	1.123E-10 1.285E-05	8.178E-06	2.220E-07	2.103E-07	4.323E-05	1.145E-05
77	4.987E-09	5.780E-09	4.307E-09	4.194E-09	1.473E-06	1.043E-06	7.140E-07	1.360E-07	5.894E-09	4.760E-09	8.160E-06	2.040E-06
78	3.485E-09	1.197E-07	2.218E-09	3.238E-09	9.856E-09	2.358E-08	1.408E-07	3.872E-07	3.379E-08	3.168E-09	2.499E-07	1.725E-06
78 79	1.365E-17	4.549E-17	1.592E-17	1.251E-17	1.638E-17	1.365E-17	2.502E-17	4.549E-17	1.319E-17	1.342E-17	3.185E-16	1.979E-17
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	3.610E-11	5.879E-11	6.498E-11	3.300E-11	1.341E-10	3.919E-11	4.229E-11	5.054E-11	3.300E-11	3.404E-11	8.457E-09	8.354E-11
83	2.310E-09	2.231E-09	1.832E-09	1.673E-09	1.115E-07	5.019E-08	2.470E-08	1.195E-08	2.071E-09	1.832E-09	8.763E-07	1.354E-07
84	5.617E-09	5.401E-09	4.104E-09	4.248E-09	6.265E-07	2.016E-07	7.921E-08	5.905E-08	4.753E-09	4.537E-09	5.113E-06	7.921E-07
85	1.786E-07	3.442E-07	9.466E-08	1.506E-07	6.239E-07	1.377E-06	4.518E-06	8.175E-06	2.367E-07	1.807E-07	2.151E-05	1.076E-05
86	5.209E-08	1.438E-07	1.688E-07	6.667E-08	1.500E-07	4.792E-08	6.459E-08	1.063E-07	4.584E-08	5.000E-08	9.792E-06	1.771E-07
87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	2.019E-06	3.197E-06	8.413E-07	1.935E-06	3.197E-06	9.254E-06	3.449E-05	7.908E-05	1.767E-06	1.935E-06	1.430E-04	8.413E-05
91	1.085E-07	1.289E-07	1.289E-07	8.819E-08	8.819E-07	1.221E-07	1.221E-07	1.153E-07	1.018E-07	9.497E-08	1.832E-05	3.324E-07
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	4.855E-09	4.734E-09	4.370E-09	3.823E-09	3.095E-07	7.890E-08	1.092E-07	1.578E-07	4.309E-09	4.066E-09	3.277E-06	3.823E-07
94	2.093E-07	1.825E-07	1.530E-07	1.476E-07	5.904E-06	3.757E-06	4.294E-06	3.757E-06	2.147E-07	1.825E-07	5.368E-05	7.515E-06
95	8.737E-07	1.290E-06	1.415E-06	8.321E-07	4.992E-06	9.569E-07	1.248E-06	1.581E-06	8.321E-07	8.321E-07	1.664E-04	2.455E-06
96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	1.810E-07	1.609E-07	1.257E-07	1.232E-07	4.022E-06	3.268E-06	2.765E-06	6.536E-07	2.011E-07	1.659E-07	4.777E-05	6.285E-06
99	1.083E-06	1.176E-06	1.176E-06	8.324E-07	1.321E-05	1.216E-06	1.150E-06	9.513E-07	9.778E-07	9.249E-07	1.982E-04	5.021E-06
100	3.824E-12	3.671E-12	2.868E-12	2.638E-12	3.441E-12	3.824E-12	3.709E-12	4.206E-12	3.594E-12	3.633E-12	8.412E-12	3.250E-12
101	2.043E-12	2.270E-12	1.816E-12	1.646E-12	1.362E-11	2.270E-12	2.440E-12	2.270E-12	1.930E-12	1.986E-12	3.802E-10	1.930E-11
102	1.916E-06	2.646E-06	2.829E-06	1.734E-06	1.004E-05	2.099E-06	2.372E-06	2.464E-06	1.825E-06	1.825E-06	3.650E-04	5.110E-06
103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 5.803E-15	0.00 2.756E-15
105 106	2.698E-15 1.101E-08	2.698E-15 1.101E-08	2.698E-15 8.259E-09	2.698E-15 7.571E-09	2.756E-15 1.032E-08	2.698E-15 1.101E-08	2.901E-15 1.101E-08	3.772E-15 1.170E-08	2.698E-15 1.032E-08	2.698E-15 1.032E-08	1.308E-07	2.756E-15 9.636E-09
107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	2.397E-08	2.326E-08	2.009E-08	1.903E-08	2.256E-08	2.397E-08	2.432E-08	2.820E-08	2.291E-08	2.291E-08	4.582E-08	2.185E-08
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	1.026E-07	1.079E-07	1.079E-07	8.668E-08	2.123E-06	1.362E-07	1.114E-07	8.491E-08	9.552E-08	9.198E-08	1.610E-05	6.368E-07
112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	2.298E-07	1.567E-06	2.298E-07	2.194E-07	1.358E-05	1.024E-05	2.507E-05	5.746E-06	2.298E-07	2.298E-07	5.223E-05	3.761E-06
114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	8.269E-07	7.698E-06	5.417E-07	3.421E-07	7.698E-07	1.939E-06	1.140E-05	3.707E-05	7.128E-07	4.847E-07	2.452E-05	5.702E-07
116	2.711E-08	2.517E-08	1.143E-08	2.130E-08	8.908E-08	2.130E-07	6.778E-07	1.297E-06	2.517E-08	7.359E-08	2.711E-06	7.746E-07
117	5.142E-10	2.475E-09	5.142E-10	4.178E-10	2.057E-08	1.028E-08	3.214E-08	1.543E-08	5.142E-10	4.821E-10	1.607E-07	9.320E-09

Figure 16. FIIDOS output - all options (Continued).

118	2.136E-07	1.543E-06	1.543E-07	1.780E-07	4.035E-05	5.815E-05	1.056E-04	6.171E-05	1.899E-07	2.611E-06	1.187E-04	8.426E-05
119	3.157E-08	5.175E-08	2.018E-09	3.053E-08	5.692E-08	1.294E-07	6.727E-07	1.915E-06	9.832E-09	4.140E-08	3.001E-06	1.708E-05
120	1.318E-12	2.845E-12	1.318E-12	9.020E-13	2.290E-11	1.388E-11	3.122E-11	8.327E-12	1.457E-12	1.249E-12	3.886E-10	1.527E-11
121	1.073E-06	9.266E-07	7.803E-07	7.705E-07	2.828E-05	2.341E-05	2.243E-05	6.242E-06	1.170E-06	1.268E-06	2.243E-04	2.633E-05
122	7.636E-12	1.386E-11	5.657E-12	6.222E-12	2.461E-09	5.939E-10	5.374E-10	9.051E-10	7.071E-12	5.374E-11	1.216E-08	2.404E-09
123	3.317E-07	4.265E-07	1.398E-07	3.080E-07	5.449E-06	1.279E-05	5.449E-05	1.114E-04	3.317E-07	4.265E-07	9.240E-05	1.256E-04
124	2.862E-12	4.389E-10	2.862E-12	2.862E-12	2.862E-08	7.060E-08	4.198E-07	1.164E-06	7.441E-10	3.625E-09	6.487E-07	3.625E-06
125	3.069E-08	2.274E-07	9.094E-09	3.069E-08	7.844E-08	1.933E-07	1.137E-06	3.410E-06	1.478E-08	6.593E-07	3.410E-06	4.774E-05
126	2.951E-12	2.497E-12	2.724E-12	2.384E-12	1.135E-08	2.611E-09	4.881E-10	2.611E-11	2.497E-12	2.270E-12	4.995E-08	7.378E-09
127	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	1.063E-08	1.299E-08	7.086E-09	8.267E-09	1.594E-05	2.716E-05	6.495E-05	5.019E-05	2.008E-08	2.598E-08	7.086E-05	4.842E-05
		0.00		0.00					0.00 0.00	0.00	0.00	0.00
130	0.00		0.00		0.00	0.00	0.00	0.00				
131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	4.413E-12	4.702E-12	3.907E-12	3.328E-12	4.051E-10	7.958E-11	2.894E-11	3.617E-11	3.473E-12	3.400E-12	4.196E-09	5.354E-10
134	4.940E-08	1.153E-07	5.763E-09	5.058E-08	1.882E-07	4.470E-07	2.352E-06	6.234E-06	2.000E-08	7.292E-08	5.881E-06	2.235E-05
135	8.971E-15	6.370E-10	3.510E-15	8.451E-15	4.290E-12	1.066E-11	6.500E-11	1.950E-10	5.070E-15	1.690E-10	2.340E-09	5.070E-09
136	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	2.861E-14	1.834E-14	6.969E-15	2.971E-14	1.540E-13	3.668E-13	1.834E-12	4.768E-12	1.761E-14	2.971E-14	2.347E-12	4.768E-12
138	2.233E-13	1.077E-13	1.839E-14	2.365E-13	1.314E-13	1.445E-13	3.416E-13	7.751E-13	8.276E-14	1.971E-13	2.759E-12	5.124E-12
139	1.745E-09	2.871E-09	6.183E-10	1.590E-09	3.754E-07	8.833E-07	4.637E-06	1.016E-05	1.435E-09	5.742E-09	5.079E-06	1.038E-05
140	2.734E-08	3.515E-08	1.289E-08	2.343E-08	3.320E-07	7.616E-07	3.124E-06	5.468E-06	2.929E-08	3.124E-08	7.030E-06	5.468E-06
141	3.251E-15	7.299E-10	1.393E-15	1.128E-15	6.370E-14	1.593E-13	9.953E-13	2.986E-12	1.725E-15	1.924E-10	7.299E-12	2.057E-11
142	1.067E-16	4.225E-16	2.024E-17	2.891E-17	3.781E-17	4.003E-17	5.115E-17	3.336E-17	7.116E-17	6.004E-16	4.670E-17	1.379E-16
143	2.653E-09	3.666E-08	9.166E-10	2.171E-09	6.271E-08	1.495E-07	7.236E-07	1.495E-06	2.123E-09	4.052E-08	1.351E-06	2.123E-06
144	1.105E-13	1.079E-12	2.105E-14	3.157E-14	3.946E-14	4.209E-14	5.525E-14	4.472E-14	7.629E-14	8.945E-13	7.366E-14	2.631E-13
145	2.762E-10	1.745E-08	4.071E-11	6.107E-11	9.305E-11	1.003E-10	1.745E-10	2.617E-10	2.036E-10	5.380E-09	8.433E-10	2.762E-09
146	1.027E-09	2.935E-09	1.824E-10	8.594E-10	1.069E-09	2.033E-09	7.546E-09	1.908E-08	1.488E-09	3.983E-09	2.515E-08	4.821E-08
147	1.187E-14	9.777E-14	2.095E-15	8.380E-15	6.076E-15	7.682E-15	1.955E-14	4.679E-14	9.777E-15	3.771E-14	1.117E-13	3.282E-13
148	1.030E-18	4.942E-18	1.647E-19	2.197E-19	5.079E-19	3.501E-19	4.324E-19	2.540E-19	6.452E-19	4.187E-18	2.814E-19	8.237E-19
149	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 16. FIIDOS output - all options (Continued).

20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
iso #	muscle	ovaries	pancreas	r marrow	skin	spleen	testes	thymus	thyroid	uterus	ubld wall	eff dose
1	6.518E-15	1.217E-14	3.389E-14	6.518E-15	6.518E-15	3.780E-14	1.955E-14	6.518E-15	6.518E-15	6.518E-15	7.387E-15	1.217E-13
2	1.576E-10	1.918E-10	1.850E-10	1.644E-10	1.028E-10	1.644E-10	1.302E-10	2.055E-10	1.713E-10	1.781E-10	1.781E-10	6.097E-10
3	4.825E-08	4.825E-08	4.945E-08	4.825E-08	4.825E-08	4.825E-08	4.825E-08	4.825E-08	4.825E-08	4.825E-08	5.549E-08	8.443E-07
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	9.538E-09	7.668E-09	1.365E-08	8.977E-09	7.294E-09	1.066E-08	6.546E-09	1.085E-08	9.912E-09	7.668E-09	7.107E-09	1.141E-07
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	3.357E-11	3.357E-11	3.357E-11	6.103E-11	3.052E-11	3.357E-11	3.357E-11	3.357E-11	3.357E-11	3.357E-11	4.272E-11	3.967E-11
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	4.303E-19	4.303E-19	4.303E-19	8.452E-19	4.303E-19	4.303E-19	4.303E-19	4.303E-19	4.303E-19	4.303E-19	5.762E-19	5.839E-19
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	1.825E-07	1.673E-07	2.130E-07	1.825E-07	1.673E-07	1.901E-07	1.597E-07	1.977E-07	1.901E-07	1.673E-07	1.597E-07	2.130E-06
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	1.480E-10	1.082E-10	2.221E-10	1.594E-10	1.082E-10	1.708E-10	9.110E-11	1.822E-10	1.594E-10	1.082E-10	1.025E-10	1.367E-09
16	1.234E-07	1.234E-07	1.234E-07	3.004E-06	1.234E-07	1.234E-07	1.234E-07	1.234E-07	1.234E-07	1.234E-07	4.238E-07	7.510E-07
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	2.532E-09	2.532E-09	2.532E-09	6.818E-07	2.532E-09	2.532E-09	2.532E-09	2.532E-09	2.532E-09	2.532E-09	5.520E-09	1.007E-07
20	8.399E-15	8.564E-15	8.399E-15	2.470E-13	8.399E-15	8.399E-15	8.399E-15	8.399E-15	8.399E-15	8.399E-15	3.952E-14	3.129E-10
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	2.658E-06	4.785E-06	2.658E-06	1.130E-05	1.927E-06	2.326E-06	1.927E-06	2.592E-06	2.526E-06	3.522E-06	1.329E-05	1.861E-05
23	3.697E-10	3.442E-10	4.972E-10	8.159E-09	2.677E-10	5.100E-10	1.785E-10	7.394E-10	3.570E-10	2.422E-10	2.550E-10	1.135E-06
24	5.628E-08	1.045E-07	1.407E-07	6.030E-08	2.492E-08	9.245E-08	5.226E-09	6.432E-08	4.422E-08	8.441E-08	2.573E-08	6.030E-07
25	2.622E-06	3.877E-06	2.850E-06	9.236E-06	2.052E-06	2.508E-06	1.938E-06	2.736E-06	2.508E-06	3.307E-06	1.710E-05	2.052E-05
26	2.627E-07	8.385E-07	4.041E-07	2.930E-07	1.212E-07	2.829E-07	5.556E-08	2.627E-07	1.717E-07	5.455E-07	2.223E-07	2.930E-05
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	1.547E-07	6.117E-07	1.758E-07	1.899E-07	6.891E-08	1.336E-07	4.992E-08	1.477E-07	9.141E-08	3.305E-07	1.828E-07	4.289E-05
29	2.064E-16	7.303E-17	5.398E-17	6.350E-13	1.746E-16	6.985E-17	3.651E-17	1.048E-16	5.874E-17	3.810E-17	1.746E-16	1.588E-13
49	2.0045-10	1.303E-I	J.JJUE-11	0.3305-13	T. / TOP-10	0.909E-I/	J. UJIE-I/	T.040E-IO	2.0/45-1/	2.010E-1/	T. / 40E-10	T.300E-T3

Figure 16. FIIDOS output - all options (Continued).

30	3.235E-20	9.220E-21	9.058E-21	3.235E-20	8.249E-21	1.779E-20	7.441E-21	9.705E-21	7.602E-21	7.602E-21	9.705E-21	2.912E-18
31	4.793E-10	4.313E-10	1.176E-09	4.183E-10	2.266E-10	7.843E-10	3.137E-11	6.100E-10	4.270E-10	3.660E-10	1.176E-10	2.004E-08
32	3.592E-13	2.052E-13	7.330E-13	3.225E-13	1.759E-13	5.278E-13	2.199E-14	5.791E-13	3.592E-13	1.686E-13	6.890E-14	1.906E-11
33	4.246E-07	4.431E-07	6.154E-07	1.477E-06	2.400E-07	5.723E-07	1.046E-07	8.616E-07	3.939E-07	2.646E-07	1.969E-07	3.077E-06
34	4.896E-10	6.779E-10	7.720E-10	6.402E-10	2.448E-10	7.532E-10	7.532E-11	1.262E-09	4.331E-10	3.201E-10	2.260E-10	3.389E-09
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	2.733E-06	1.075E-05	2.777E-06	4.928E-06	1.299E-06	2.240E-06	1.210E-06	2.598E-06	1.658E-06	5.376E-06	3.584E-06	6.272E-05
37	1.060E-07	2.331E-07	2.331E-07	1.102E-07	4.663E-08	1.568E-07	1.272E-08	1.144E-07	7.630E-08	1.780E-07	5.510E-08	3.094E-06
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	2.455E-07	1.043E-06	2.700E-07	3.314E-07	1.056E-07	2.455E-07	1.068E-07	3.437E-07	1.473E-07	4.909E-07	3.559E-07	1.596E-05
41	5.336E-17	5.336E-17	5.336E-17	5.336E-17	5.336E-17	5.336E-17	5.336E-17	5.336E-17	1.375E-15	5.336E-17	2.201E-16	2.366E-14
42	9.709E-09	3.398E-08	1.416E-08	1.092E-08	3.641E-09	1.011E-08	2.508E-09	9.305E-09	3.236E-08	2.185E-08	1.133E-08	1.214E-07
43	4.661E-11	3.944E-11	1.183E-10	3.944E-11	2.187E-11	7.888E-11	2.653E-12	6.095E-11	4.302E-11	3.406E-11	1.111E-11	1.613E-09
44	1.077E-10	7.899E-11	2.513E-10	9.335E-11	5.027E-11	1.687E-10	1.508E-11	1.293E-10	5.386E-10	6.822E-11	3.195E-11	7.540E-09
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	9.113E-08	1.215E-07	1.519E-07	1.164E-07	4.506E-08	1.418E-07	1.519E-08	2.430E-07	8.101E-08	5.569E-08	4.101E-08	1.570E-06
49	4.400E-12	7.175E-12	5.261E-12	1.052E-12	8.131E-13	1.913E-12	5.740E-13	8.131E-13	6.218E-13	2.726E-12	1.531E-12	1.483E-09
50	2.269E-10	2.030E-10	5.374E-10	2.030E-10	1.182E-10	3.702E-10	3.344E-11	2.985E-10	1.051E-09	1.791E-10	7.762E-11	5.613E-09
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	2.366E-07	8.173E-07	3.441E-07	2.796E-07	9.894E-08	2.366E-07	5.592E-08	2.151E-07	1.463E-07	4.947E-07	2.151E-07	5.592E-06
54	1.197E-08	4.410E-08	1.239E-08	1.449E-08	6.090E-09	1.071E-08	6.300E-09	1.239E-08	7.560E-09	2.310E-08	1.827E-08	9.450E-07
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	4.836E-09	2.901E-09	7.297E-09	5.803E-09	3.253E-09	7.034E-09	1.934E-09	1.143E-08	4.748E-09	2.374E-09	2.462E-09	5.803E-07
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	2.074E-20	2.074E-20	2.074E-20	1.144E-19	2.074E-20	2.074E-20	2.074E-20	2.074E-20	2.074E-20	2.074E-20	2.503E-19	4.219E-16
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	4.090E-10	2.191E-09	2.629E-10	3.067E-10	9.494E-11	1.972E-10	7.011E-11	1.753E-10	8.764E-11	5.258E-10	5.623E-10	3.871E-07
61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	1.834E-14	7.995E-15	3.057E-14	2.304E-14	9.876E-15	3.010E-14	1.129E-15	5.173E-14	1.740E-14	4.280E-15	2.822E-15	5.643E-14
63	1.636E-10	4.430E-10	1.976E-10	1.976E-10	9.881E-11	1.806E-10	8.859E-11	2.556E-10	1.261E-10	2.283E-10	1.772E-10	6.815E-08
64	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	5.289E-13	7.807E-12
65	1.268E-11	1.332E-11	1.365E-11	1.300E-11	1.220E-11	1.365E-11	1.188E-11	1.397E-11	1.252E-11	1.252E-11	1.220E-11	1.236E-09
66	7.260E-11	7.260E-12	7.920E-12	5.676E-11	7.260E-11	7.920E-12	7.260E-11	7.920E-12	7.260E-12	7.260E-12	1.188E-11	5.346E-10
67	2.241E-13	2.858E-13	3.572E-13	3.897E-13	1.266E-13	7.920E-12 3.247E-13	7.260E-12 5.196E-14	7.920E-12 5.521E-13	7.260E-12 2.111E-13	1.494E-13	1.396E-13	2.111E-12
68	2.712E-10	6.027E-10	3.229E-10	1.765E-09	1.722E-10	3.100E-10	1.335E-10	4.305E-10	2.111E-13 2.239E-10	3.186E-10	4.735E-10	1.464E-08
69	1.752E-10	1.489E-10	2.599E-10	4.964E-10	1.022E-10 1.022E-10	2.365E-10	6.132E-11	3.504E-10	1.606E-10	1.051E-10	9.344E-11	1.404E-08 1.402E-09
70	4.999E-15	7.179E-15	3.718E-15	6.538E-14	2.436E-15	4.999E-15	1.923E-15	5.384E-15	3.974E-14	2.692E-15	6.025E-15	1.402E-09 4.871E-13
70 71	6.743E-14	5.882E-14	8.752E-14	2.009E-13	4.591E-14	8.034E-14	3.587E-14	1.076E-13	6.600E-14	4.878E-14	4.448E-14	4.017E-13
71 72	3.117E-11	8.311E-11	4.294E-11	4.848E-11	1.524E-11	4.017E-11	1.039E-11	6.372E-11	2.493E-11	4.017E-11	3.117E-11	2.563E-10
72	2.889E-08	1.062E-07	3.272E-08	6.374E-08	1.524E-11 1.445E-08	2.847E-08	1.039E-11 1.360E-08	3.909E-08	2.493E-11 1.955E-08	4.01/E-11 5.099E-08	4.674E-08	8.923E-10
73 74	2.889E-08 9.633E-11	1.204E-10	9.633E-11	2.007E-10	8.831E-11	2.847E-08 9.633E-11	8.831E-11	3.909E-08 9.633E-11	3.372E-10	1.044E-10	6.583E-10	8.923E-07 1.606E-08
7 <del>4</del> 75	3.718E-12	3.999E-12	3.578E-11	1.894E-10	3.017E-11	3.718E-12	2.806E-12	3.929E-12	7.016E-11	3.087E-12	8.419E-12	5.543E-10
76	2.220E-07	7.126E-07	3.154E-07	2.921E-07	1.086E-07	2.337E-07	6.542E-08	2.220E-07	1.519E-07	4.556E-07	2.921E-07	4.206E-06
77 78	5.440E-09 2.781E-09	8.387E-09	8.500E-09	5.667E-09	3.854E-09 2.253E-09	6.460E-09	3.060E-09	5.327E-09 3.450E-09	5.667E-09 4.576E-08	6.914E-09 2.534E-09	1.473E-08 6.688E-09	6.574E-07 2.464E-07
		3.450E-09	3.027E-09	5.280E-08		2.992E-09	2.077E-09					
79	3.412E-17	1.410E-17	1.365E-17	1.570E-17	1.570E-17	1.342E-17	1.274E-17	1.934E-17	2.275E-13	1.388E-17	4.777E-17	1.160E-14
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 16. FIIDOS output - all options (Continued).

82	6.188E-11	4.229E-11	4.641E-11	5.260E-11	3.610E-11	3.816E-11	3.300E-11	7.323E-11	1.857E-08	5.673E-11	4.848E-10	1.000E-09
83	2.390E-09	3.187E-09	5.497E-09	2.310E-09	1.195E-09	3.744E-09	3.983E-10	2.948E-09	4.939E-08	2.549E-09	1.514E-09	5.656E-08
84	5.617E-09	7.201E-09	1.224E-08	5.329E-09	2.808E-09	8.641E-09	1.224E-09	6.985E-09	4.897E-07	5.689E-09	4.681E-09	3.312E-07
85	1.893E-07	7.100E-07	2.001E-07	2.582E-07	9.036E-08	1.721E-07	8.606E-08	2.130E-07	7.745E-06	3.442E-07	3.227E-07	3.012E-06
86	1.458E-07	5.000E-08	5.625E-08	1.146E-07	7.709E-08	5.209E-08	3.959E-08	1.771E-07	4.375E-04	5.834E-08	7.709E-07	2.292E-05
87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	1.851E-06	6.562E-06	1.935E-06	2.356E-06	9.254E-07	1.767E-06	1.010E-06	2.356E-06	5.384E-05	3.197E-06	6.898E-06	2.524E-05
91	1.357E-07	1.085E-07	1.560E-07	1.221E-07	8.819E-08	1.221E-07	8.819E-08	1.560E-07	1.289E-05	1.357E-07	1.153E-06	1.357E-06
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	5.644E-09	9.103E-09	1.032E-08	5.401E-09	2.731E-09	7.283E-09	1.153E-09	6.676E-09	3.277E-07	5.462E-09	7.283E-09	1.942E-07
93 94	2.281E-07	4.831E-07	4.562E-07	2.308E-07	1.074E-07	3.221E-07	4.831E-08	2.496E-07	6.709E-06	3.489E-07	2.523E-07	3.757E-06
95 96	1.331E-06	9.569E-07	9.985E-07	1.165E-06	9.153E-07	8.737E-07	7.905E-07	1.498E-06	1.706E-03 0.00	1.165E-06 0.00	2.288E-05 0.00	8.737E-05
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				0.00
97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	1.986E-07	4.525E-07	4.022E-07	2.061E-07	9.302E-08	2.765E-07	4.022E-08	2.087E-07	8.799E-07	3.520E-07	2.363E-07	2.765E-06
99	1.229E-06	9.513E-07	1.718E-06	1.110E-06	7.928E-07	1.321E-06	7.267E-07	1.453E-06	4.757E-05	1.070E-06	7.003E-06	1.031E-05
100	3.212E-12	3.824E-12	3.824E-12	3.441E-12	2.409E-12	3.594E-12	3.212E-12	3.441E-12	3.441E-12	4.206E-12	3.747E-12	3.671E-12
101	1.930E-12	2.043E-12	2.157E-12	1.873E-12	1.589E-12	1.986E-12	1.816E-12	1.986E-12	1.930E-12	2.043E-12	2.100E-12	1.476E-11
102	2.737E-06	2.099E-06	2.464E-06	2.372E-06	1.825E-06	2.099E-06	1.734E-06	3.285E-06	7.482E-04	2.646E-06	3.011E-05	4.197E-05
103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	2.698E-15	2.698E-15	3.192E-15	2.872E-15								
106	8.948E-09	1.101E-08	1.170E-08	9.636E-09	6.607E-09	1.032E-08	8.948E-09	1.032E-08	1.032E-08	1.170E-08	1.101E-08	1.308E-08
107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	2.150E-08	2.432E-08	2.432E-08	2.220E-08	1.833E-08	2.291E-08	2.150E-08	2.220E-08	2.220E-08	2.467E-08	2.467E-08	2.361E-08
109	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	1.097E-07	8.491E-08	1.592E-07	1.026E-07	8.137E-08	1.274E-07	7.076E-08	1.291E-07	1.167E-07	8.491E-08	7.606E-08	7.960E-07
112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	2.298E-07	2.612E-07	2.507E-07	1.567E-06	2.194E-07	2.403E-07	2.194E-07	2.298E-07	2.298E-07	2.507E-07	2.194E-06	5.746E-06
114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	6.273E-07	1.910E-06	6.273E-07	5.417E-06	3.707E-07	4.847E-07	3.992E-07	4.562E-07	4.562E-07	9.694E-07	9.694E-07	4.562E-06
116	2.517E-08	1.046E-07	2.905E-08	3.486E-08	1.239E-08	2.324E-08	1.104E-08	2.905E-08	1.569E-08	5.035E-08	3.292E-08	2.905E-07
117	5.464E-10	6.106E-10	8.035E-10	2.314E-09	4.178E-10	6.428E-10	3.535E-10	6.106E-10	5.464E-10	5.464E-10	2.539E-09	1.125E-08
118	1.899E-07	3.086E-07	2.255E-07	4.391E-07	1.543E-07	2.018E-07	1.305E-07	2.018E-07	1.662E-07	2.374E-07	1.662E-07	2.730E-05
119	1.449E-08	2.225E-08	2.329E-08	1.915E-08	6.210E-09	2.277E-08	1.915E-09	3.829E-08	1.138E-08	1.035E-08	7.245E-09	2.173E-06
120	1.596E-12	2.706E-12	2.220E-12	3.053E-12	9.020E-13	1.596E-12	6.869E-13	1.665E-12	1.388E-12	2.012E-12	3.608E-12	1.804E-11
121	1.170E-06	2.536E-06	2.146E-06	1.170E-06	5.754E-07	1.561E-06	2.341E-07	1.268E-06	8.875E-07	1.951E-06	7.315E-07	1.463E-05
122	7.919E-12	1.980E-11	1.046E-11	1.301E-11	4.808E-12	8.202E-12	4.242E-12	8.485E-12	6.222E-12	1.103E-11	7.636E-12	9.333E-10
123	4.028E-07	1.895E-06	4.028E-07	4.976E-07	1.493E-07	3.317E-07	1.493E-07	4.028E-07	1.967E-07	8.530E-07	5.449E-07	2.606E-05
123	2.862E-12	2.862E-12	2.862E-12	4.389E-10	2.862E-12	2.862E-12	2.862E-12	2.862E-12	2.862E-12	2.862E-12	1.526E-11	5.343E-07
125	1.705E-08	1.069E-08	2.387E-08	1.364E-07	1.250E-08	2.387E-08	7.957E-09	3.524E-08	1.591E-08	9.322E-09	8.753E-09	6.025E-06
126	3.178E-12	2.611E-12	7.606E-12	2.724E-12	1.589E-12	5.108E-12	2.951E-13	4.200E-12	2.951E-12	2.270E-12	8.854E-13	3.405E-09
127	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	1.358E-08	4.960E-08	1.771E-08	1.712E-08	6.495E-09	1.299E-08	3.897E-09	1.299E-08	8.267E-09	2.893E-08	1.476E-08	1.535E-05
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	4.919E-12	3.617E-12	1.158E-11	4.051E-12	2.170E-12	7.958E-12	2.387E-13	6.222E-12	4.341E-12	2.894E-12	1.013E-12	2.170E-10

 $\label{eq:Figure 16.FIIDOS output - all options (Continued).}$ 

134	2.823E-08	8.586E-08	3.881E-08	4.117E-08	1.129E-08	3.764E-08	6.939E-09	6.116E-08	2.000E-08	3.646E-08	2.470E-08	3.176E-06
135	5.590E-15	3.770E-15	7.540E-15	5.070E-11	4.290E-15	7.020E-15	3.380E-15	9.751E-15	5.070E-15	3.640E-15	3.510E-14	6.370E-10
136	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	2.091E-14	7.336E-14	2.457E-14	2.751E-14	9.903E-15	2.311E-14	7.336E-15	3.594E-14	1.394E-14	3.374E-14	2.311E-14	9.536E-13
138	1.012E-13	1.274E-13	1.708E-13	1.314E-13	5.124E-14	1.576E-13	1.314E-14	2.759E-13	9.196E-14	5.912E-14	4.073E-14	7.751E-13
139	1.700E-09	7.508E-09	1.855E-09	3.312E-09	6.846E-10	1.590E-09	7.067E-10	2.076E-09	9.717E-10	3.533E-09	2.429E-09	2.054E-06
140	3.320E-08	1.543E-07	3.515E-08	4.101E-08	1.269E-08	2.929E-08	1.289E-08	3.320E-08	1.718E-08	7.421E-08	4.687E-08	1.347E-06
141	1.593E-15	1.128E-15	1.858E-15	5.773E-11	1.194E-15	1.062E-15	9.290E-16	1.128E-15	9.953E-16	9.290E-16	2.787E-14	2.654E-11
142	3.113E-17	3.113E-17	8.006E-17	1.557E-16	1.957E-17	2.891E-17	8.228E-18	2.891E-17	1.846E-17	2.224E-17	1.468E-17	9.340E-17
143	2.798E-09	1.351E-08	2.991E-09	1.399E-08	1.013E-09	2.316E-09	1.013E-09	2.846E-09	1.254E-09	5.789E-09	4.583E-09	3.859E-07
144	3.157E-14	3.157E-14	8.155E-14	2.394E-13	2.052E-14	3.157E-14	8.682E-15	3.157E-14	1.973E-14	2.394E-14	1.552E-14	1.394E-13
145	7.124E-11	7.124E-11	2.181E-10	1.454E-09	3.344E-11	6.688E-11	1.221E-11	7.270E-11	3.780E-11	4.798E-11	2.908E-11	1.003E-09
146	5.031E-10	1.132E-09	7.965E-10	1.425E-09	2.725E-10	6.708E-10	1.342E-10	9.852E-10	3.983E-10	5.240E-10	3.983E-10	7.965E-09
147 148	4.679E-15 2.608E-19	5.517E-15 2.608E-19	8.380E-15 5.560E-18	2.025E-14 1.030E-18	2.654E-15 1.579E-19	6.355E-15 4.324E-19	9.777E-16 6.658E-20	9.079E-15 2.334E-19	3.911E-15 1.441E-19	3.073E-15 1.922E-19	2.165E-15 1.236E-19	5.098E-14 8.237E-19
148	0.00 0.00	0.00 0.00	0.00	0.00	0.00	4.324E-19 0.00	0.00	2.334E-19 0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12 13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 0.00	0.00 0.00	0.00
13 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 16. FIIDOS output - all options (Continued).

16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

total dose commitments in rem for intake at time = 4.00 hours with duration time = 0.250 hours

	fission products	activation products	actinides(g+b)	actinides(a)	total
adrenals	1.940E-05	0.00	0.00	0.00	1.940E-05
bone sur	f 6.665E-05	0.00	0.00	0.00	6.665E-05
brain	1.655E-05	0.00	0.00	0.00	1.655E-05
breast	1.577E-05	0.00	0.00	0.00	1.577E-05
st wall	3.192E-04	0.00	0.00	0.00	3.192E-04
si wall	4.332E-04	0.00	0.00	0.00	4.332E-04
uli wall	1.109E-03	0.00	0.00	0.00	1.109E-03
lli wall	1.226E-03	0.00	0.00	0.00	1.226E-03
kidneys	1.897E-05	0.00	0.00	0.00	1.897E-05
liver	2.182E-05	0.00	0.00	0.00	2.182E-05
et regio	n 3.062E-03	0.00	0.00	0.00	3.062E-03
lung	1.066E-03	0.00	0.00	0.00	1.066E-03
muscle	2.120E-05	0.00	0.00	0.00	2.120E-05
ovaries	4.477E-05	0.00	0.00	0.00	4.477E-05
pancreas	2.386E-05	0.00	0.00	0.00	2.386E-05
r marrow	5.019E-05	0.00	0.00	0.00	5.019E-05
skin	1.308E-05	0.00	0.00	0.00	1.308E-05
spleen	1.977E-05	0.00	0.00	0.00	1.977E-05
testes	1.176E-05	0.00	0.00	0.00	1.176E-05
thymus	2.342E-05	0.00	0.00	0.00	2.342E-05
thyroid	3.033E-03	0.00	0.00	0.00	3.033E-03
uterus	2.950E-05	0.00	0.00	0.00	2.950E-05
ubld wal	l 1.108E-04	0.00	0.00	0.00	1.108E-04
eff dose	5.270E-04	0.00	0.00	0.00	5.270E-04

radionuclides contributing > 1% to effective dose equivalent

nuclide	rem	percent
sr-91	1.861E-05	3.5
sr-92	2.052E-05	3.9
y-92	2.930E-05	5.6
y-93	4.289E-05	8.1
zr-97	6.272E-05	11.9
mo-99	1.596E-05	3.0
ru-105	5.592E-06	1.1
i-131	2.292E-05	4.3
te-132	2.524E-05	4.8
i-133	8.737E-05	16.6
i-134	1.031E-05	2.0
i-135	4.197E-05	8.0

Figure 16. FIIDOS output - all options (Continued).

```
ba-139
           5.746E-06
                        1.1
la-141
           2.730E-05
                        5.2
la-142
                        2.8
           1.463E-05
ce-143
           2.606E-05
                        4.9
ce-144
           6.025E-06
                        1.1
pr-145
           1.535E-05
                        2.9
    pu239 fraction in urine from inhalation exposure
                                                             uptake fraction=5.000E-02
time after shot (yrs)
                                        55.
                              50.
                                                   60.
conc (ci/day) or (ci/1.41)
                              0.0
                                        0.0
                                                  0.0
         total of all measurements and exposures
          total dose commitments in rem for all intakes by DCF set
Doses from Specified DCF File
DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
          fission products activation products actinides(g+b)
                                                                     actinides(a)
                                                                                         total
adrenals
              1.940E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.940E-05
bone surf
              6.665E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       6.665E-05
brain
              1.655E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.655E-05
breast
              1.577E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.577E-05
st wall
              3.192E-04
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       3.192E-04
 si wall
                                  0.00
                                                                       0.00
              4.332E-04
                                                     0.00
                                                                                       4.332E-04
uli wall
              1.109E-03
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.109E-03
 lli wall
              1.226E-03
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.226E-03
kidneys
              1.897E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.897E-05
              2.182E-05
                                  0.00
                                                                       0.00
liver
                                                     0.00
                                                                                       2.182E-05
                                  0.00
                                                                       0.00
 et region
              3.062E-03
                                                     0.00
                                                                                       3.062E-03
 lung
              1.066E-03
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.066E-03
muscle
              2.120E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       2.120E-05
ovaries
              4.477E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       4.477E-05
              2.386E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       2.386E-05
pancreas
              5.019E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       5.019E-05
r marrow
 skin
              1.308E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.308E-05
              1.977E-05
                                  0.00
                                                                       0.00
                                                                                       1.977E-05
 spleen
                                                     0.00
 testes
              1.176E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.176E-05
 thymus
              2.342E-05
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       2.342E-05
              3.033E-03
                                  0.00
                                                     0.00
                                                                       0.00
 thyroid
                                                                                       3.033E-03
                                                                       0.00
uterus
              2.950E-05
                                  0.00
                                                     0.00
                                                                                       2.950E-05
ubld wall
              1.108E-04
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       1.108E-04
eff dose
              5.270E-04
                                  0.00
                                                     0.00
                                                                       0.00
                                                                                       5.270E-04
    pu239 fraction in urine from all exposures
time after shot (yrs)
                              50.
                                        55.
                                                   60.
conc (ci/day) or (ci/1.41)
                              0.0
                                        0.0
                                                  0.0
```

Figure 16. FIIDOS output - all options (Concluded).

## **SECTION 4**

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APPENDIX A

**DOSE FACTORS** 

Table A-1. Ingestion dose conversion factors based on ICRP-72.

Nuclide	Adrenals	B Surface	Brain	Breast	S Wall	SI Wall	ULI Wall	_LLI Wall	Kidneys	Liver	ET Region	Lung
Se-79	3.58E-03	3.58E-03	3.58E-03	3.58E-03	3.81E-03	3.70E-03	5.27E-03	8.52E-03	1.20E-01	5.15E-02	3.58E-03	3.58E-03
Br-82	1.81E-03	1.67E-03	1.22E-03	1.13E-03	3.09E-03	2.09E-03	2.68E-03	3.40E-03	1.71E-03	1.69E-03	1.51E-03	1.45E-03
Br-83	2.71E-05	2.70E-05	2.68E-05	2.69E-05	1.12E-03	5.40E-05	6.53E-05	4.11E-05	2.71E-05	2.70E-05	2.69E-05	2.69E-05
Kr-83m	0.00E+00											
Br-84 Br-85	3.51E-05 0.00E+00	2.15E-05 0.00E+00	1.64E-05 0.00E+00	2.11E-05 0.00E+00	2.53E-03 0.00E+00	8.75E-05 0.00E+00	5.52E-05 0.00E+00	2.72E-05 0.00E+00	3.39E-05 0.00E+00	2.73E-05 0.00E+00	1.81E-05 0.00E+00	2.43E-05 0.00E+00
Kr-85	0.00E+00											
Kr-85m	0.00E+00											
Rb-86	8.20E-03	3.06E-02	8.04E-03	7.94E-03	1.09E-02	8.24E-03	1.16E-02	1.81E-02	8.13E-03	8.10E-03	8.09E-03	8.05E-03
Kr-87	0.00E+00											
Rb-87	4.28E-03	1.70E-02	4.28E-03	4.28E-03	4.75E-03	4.29E-03	6.14E-03	9.74E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03
Kr-88	0.00E+00											
Rb-88	1.24E-05	9.95E-06	8.01E-06	9.19E-06	2.71E-03	7.24E-05	2.43E-05	1.06E-05	1.21E-05	1.05E-05	8.30E-06	9.90E-06
Kr-89	0.00E+00											
Rb-89 Sr-89	2.05E-05 7.25E-04	1.77E-05 2.21E-02	6.85E-06 7.25E-04	1.04E-05 7.25E-04	1.34E-03 3.21E-03	4.49E-05 5.07E-03	2.68E-05 2.88E-02	1.62E-05 8.20E-02	1.93E-05 7.25E-04	1.44E-05 7.25E-04	7.62E-06 7.25E-04	1.26E-05 7.25E-04
Rb-90	0.00E+00											
Rb-90m	0.00E+00											
Sr-90	2.46E-03	1.51E+00	2.46E-03	2.46E-03	3.33E-03	4.20E-03	2.16E-02	8.10E-02	2.46E-03	2.46E-03	2.46E-03	2.46E-03
Y-90	4.77E-08	1.38E-06	4.77E-08	4.77E-08	3.95E-03	9.46E-03	5.01E-02	1.17E-01	4.77E-08	1.35E-06	4.77E-08	4.77E-08
Rb-91	0.00E+00											
Sr-91	1.59E-04	5.24E-04	6.90E-05	7.91E-05	3.16E-03	4.78E-03	1.39E-02	1.47E-02	2.28E-04	1.81E-04	7.39E-05	9.52E-05
Y-91	1.28E-06	2.32E-05	4.49E-07	6.39E-07	2.57E-03	6.42E-03	3.86E-02	1.12E-01	2.26E-06	2.28E-05	4.81E-07	7.20E-07
Y-91m	1.07E-05	3.79E-06	5.25E-08	2.39E-06	1.83E-04	8.64E-05	1.05E-04	8.99E-05	1.38E-05	8.38E-06	2.48E-07	3.77E-06
Sr-92	9.60E-05	2.60E-04	3.68E-05	4.90E-05	1.95E-03	3.82E-03	1.14E-02	8.06E-03	1.32E-04	1.02E-04	3.96E-05	5.75E-05
Y-92 Sr-93	1.30E-05	7.74E-06	1.06E-07	3.02E-06	5.26E-03	7.34E-03 0.00E+00	1.23E-02	6.33E-03	2.30E-05	1.59E-05	4.51E-07	4.48E-06 0.00E+00
Y-93	0.00E+00 8.61E-06	0.00E+00 7.75E-06	0.00E+00 9.74E-08	0.00E+00 1.95E-06	0.00E+00 4.74E-03	9.29E-03	0.00E+00 2.93E-02	0.00E+00 3.24E-02	0.00E+00 1.75E-05	0.00E+00 1.24E-05	0.00E+00 3.59E-07	2.82E-06
Zr-93	5.22E-06	1.95E-01	7.87E-06	2.69E-06	8.51E-05	2.10E-04	1.26E-03	3.70E-03	2.13E-06	1.83E-06	1.35E-06	2.82E-06
Nb-93m	1.38E-05	1.39E-04	1.37E-05	1.34E-05	1.38E-04	3.24E-04	1.88E-03	5.48E-03	2.12E-04	2.45E-04	1.35E-05	1.37E-05
Y-94	1.01E-05	2.69E-06	8.43E-08	2.66E-06	2.37E-03	6.03E-04	1.46E-04	1.72E-05	1.08E-05	6.37E-06	3.29E-07	3.99E-06
Y-95	4.11E-06	1.10E-06	6.20E-08	1.31E-06	1.39E-03	2.09E-04	3.30E-05	7.48E-06	4.39E-06	2.60E-06	1.98E-07	1.79E-06
Zr-95	4.97E-04	8.33E-03	1.98E-04	1.38E-04	1.42E-03	3.98E-03	1.15E-02	2.90E-02	6.14E-04	4.01E-04	1.57E-04	2.24E-04
Nb-95	2.75E-04	3.51E-04	4.34E-05	7.15E-05	1.05E-03	3.07E-03	6.79E-03	1.49E-02	5.81E-04	5.32E-04	4.79E-05	1.09E-04
Y-96	0.00E+00											
Zr-97	1.94E-04	2.34E-04	8.71E-06	4.46E-05	4.51E-03	1.20E-02	4.52E-02	6.57E-02	4.10E-04	2.95E-04	1.40E-05	6.42E-05
Nb-97	1.71E-05 0.00E+00	6.95E-06	1.54E-07 0.00E+00	3.87E-06 0.00E+00	1.44E-03 0.00E+00	1.05E-03 0.00E+00	7.99E-04 0.00E+00	1.76E-04 0.00E+00	2.39E-05 0.00E+00	1.50E-05 0.00E+00	4.93E-07 0.00E+00	6.00E-06 0.00E+00
Nb-97m Nb-98m	0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00
Mo-99	1.25E-03	3.78E-03	8.95E-04	8.98E-04	2.75E-03	1.10E-03	1.55E-03	2.14E-03	1.15E-02	1.03E-02	9.36E-04	1.02E-03
Tc-99	1.43E-04	1.43E-04	1.43E-04	1.43E-04	8.01E-03	6.84E-04	5.06E-03	1.46E-02	1.43E-04	1.91E-04	1.43E-04	1.43E-04
Tc-99m	1.45E-05	1.93E-05	4.53E-06	4.87E-06	2.06E-04	1.42E-04	2.87E-04	1.99E-04	2.04E-05	1.61E-05	5.40E-06	7.70E-06
Mo-101	1.65E-05	8.25E-06	5.10E-06	7.71E-06	1.20E-03	3.97E-05	2.29E-05	1.03E-05	1.75E-05	1.32E-05	5.74E-06	9.70E-06
Tc-101	2.73E-06	9.21E-07	1.19E-07	6.70E-07	5.55E-04	9.99E-05	2.05E-05	2.94E-06	2.86E-06	1.67E-06	1.60E-07	1.07E-06
Mo-102	0.00E+00											
Tc-102	0.00E+00											
Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
Se-79	3.58E-03	6.75E-03	1.85E-02	3.58E-03	3.58E-03	2.06E-02	1.06E-02	3.58E-03	3.58E-03	3.58E-03	4.11E-03	1.07E-02
Br-82	1.47E-03	2.14E-03	2.09E-03	1.59E-03	1.03E-03	1.79E-03	1.45E-03	1.53E-03	1.51E-03	1.99E-03	1.99E-03	2.02E-03
Br-83	2.69E-05	2.70E-05	2.76E-05	2.69E-05	2.68E-05	2.73E-05	2.69E-05	2.69E-05	2.69E-05	2.70E-05	3.09E-05	1.62E-04
Kr-83m	0.00E+00											
Br-84	2.38E-05	2.53E-05	8.57E-05	2.32E-05	1.86E-05	5.93E-05	1.79E-05	2.15E-05	1.81E-05	2.47E-05	2.06E-05	3.26E-04
Br-85	0.00E+00											
Kr-85	0.00E+00											
Kr-85m	0.00E+00	0.00E+00	0.00E+00	0.00E+00 1.56E-02	0.00E+00 7.93E-03	0.00E+00 8.11E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rb-86 Kr-87	8.06E-03 0.00E+00	8.19E-03 0.00E+00	8.17E-03 0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E-03 0.00E+00	8.06E-03 0.00E+00	8.09E-03 0.00E+00	8.17E-03 0.00E+00	1.07E-02 0.00E+00	1.05E-02 0.00E+00
Rb-87	4.28E-03	4.28E-03	4.28E-03	8.47E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	5.75E-03	5.45E-03
Kr-88	0.00E+00											
Rb-88	9.76E-06	9.92E-06	2.51E-05	9.83E-06	8.63E-06	1.86E-05	8.28E-06	9.14E-06	8.30E-06	9.76E-06	8.83E-06	3.35E-04
Kr-89	0.00E+00											
Rb-89	1.21E-05	1.24E-05	5.89E-05	1.40E-05	8.78E-06	3.91E-05	7.61E-06	1.01E-05	7.62E-06	1.20E-05	1.00E-05	1.73E-04
Sr-89	7.25E-04	7.25E-04	7.25E-04	1.77E-02	7.25E-04	7.25E-04	7.25E-04	7.25E-04	7.25E-04	7.25E-04	2.49E-03	9.49E-03
Rb-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00 0.00E+00	0.00E+00						
Rb-90m Sr-90	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 6.63E-01	2.46E-03	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 2.46E-03	0.00E+00 5.49E-03	0.00E+00 1.02E-01
Y-90	4.79E-08	5.28E-08	4.78E-08	1.38E-06	4.77E-08	4.77E-08	4.77E-08	4.77E-08	4.77E-08	4.78E-08	2.24E-07	9.94E-03
Rb-91	0.00E+00											
Sr-91	1.68E-04	8.07E-04	2.55E-04	5.81E-04	9.79E-05	1.93E-04	1.25E-04	8.21E-05	7.39E-05	4.69E-04	6.92E-04	2.40E-03
Y-91	2.02E-06	1.38E-05	2.06E-06	2.44E-05	1.06E-06	1.71E-06	1.75E-06	5.88E-07	4.81E-07	6.25E-06	4.68E-06	8.75E-03
Y-91m	6.55E-06	2.99E-05	3.65E-05	8.35E-06	2.50E-06	2.32E-05	1.45E-06	1.72E-06	2.48E-07	2.35E-05	7.28E-06	4.27E-05
Sr-92	8.77E-05	3.46E-04	1.90E-04	2.39E-04	5.53E-05	1.37E-04	5.72E-05	4.76E-05	3.96E-05	2.42E-04	4.60E-04	1.58E-03
Y-92	1.26E-05	8.16E-05	3.36E-05	1.78E-05	4.97E-06	2.22E-05	5.16E-06	2.18E-06	4.51E-07	5.25E-05	2.04E-05	1.83E-03
Sr-93	0.00E+00											
Y-93	1.11E-05	8.15E-05	1.90E-05	1.64E-05	4.35E-06	1.34E-05	6.39E-06	1.43E-06	3.59E-07	4.42E-05	2.32E-05	4.27E-03
Zr-93 Nb-93m	4.91E-06 1.39E-05	1.65E-06 2.32E-05	1.25E-06 1.37E-05	1.57E-02 5.36E-05	3.95E-06 1.33E-05	1.61E-06 1.36E-05	8.61E-07 1.35E-05	2.38E-06 1.35E-05	1.35E-06 1.35E-05	9.10E-07 1.37E-05	4.23E-06 1.78E-05	4.12E-03 4.60E-04
Y-94	4.86E-06	1.42E-05	3.63E-05	5.22E-06	2.08E-06	2.27E-05	9.32E-07	2.00E-06	3.29E-07	1.20E-05	3.76E-06	3.01E-04
Y-95	1.97E-06	4.45E-06	1.59E-05	1.97E-06	9.11E-07	9.90E-06	3.96E-07	1.00E-06	1.98E-07	3.71E-06	1.38E-06	1.71E-04
Zr-95	5.06E-04	3.25E-03	5.47E-04	1.78E-03	2.34E-04	4.15E-04	3.87E-04	1.61E-04	1.57E-04	1.50E-03	1.06E-03	3.56E-03
Nb-95	3.91E-04	3.04E-03	4.35E-04	6.45E-04	1.59E-04	3.30E-04	3.31E-04	6.92E-05	4.79E-05	1.37E-03	9.66E-04	2.17E-03
Y-96	0.00E+00											
Zr-97	2.95E-04	2.31E-03	3.91E-04	4.90E-04	1.12E-04	2.83E-04	2.05E-04	3.50E-05	1.40E-05	1.14E-03	6.76E-04	7.64E-03
Nb-97	1.17E-05	6.00E-05	5.45E-05	1.55E-05	4.51E-06	3.48E-05	3.10E-06	2.81E-06	4.93E-07	4.55E-05	1.45E-05	2.54E-04
Nb-97m	0.00E+00											
Nb-98m	0.00E+00											
Mo-99	9.59E-04	1.02E-03	1.21E-03	2.27E-03	8.71E-04	1.05E-03	9.08E-04	9.53E-04	9.36E-04	1.01E-03	1.60E-03	2.24E-03
Tc-99 Tc-99m	1.43E-04 1.30E-05	1.43E-04 6.19E-05	1.43E-04 3.29E-05	1.43E-04 1.62E-05	1.43E-04 5.79E-06	1.43E-04 2.30E-05	1.43E-04 7.61E-06	1.43E-04 5.93E-06	3.74E-03 1.76E-04	1.43E-04 4.14E-05	5.93E-04 2.88E-05	2.37E-03 8.25E-05
Mo-101	9.35E-06	9.69E-06	4.85E-05	9.14E-06	6.50E-06	3.21E-05	5.68E-06	7.60E-06	5.74E-06	9.28E-06	7.01E-06	1.53E-05
Tc-101	1.26E-06	2.98E-06	1.04E-05	1.29E-06	5.35E-07	6.61E-06	2.45E-07	5.18E-07	4.42E-06	2.57E-06	8.85E-07	6.96E-05
Mo-102	0.00E+00											
Tc-102	0.00E+00											

Table A-1. Ingestion dose conversion factors based on ICRP-72.

Nuclide	Adrenals	B Surface	Brain	Breast	S Wall	SI Wall	ULI Wall	LLI Wall	Kidneys	Liver	ET Region	Lung
Tc-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-103	3.78E-04	4.10E-04	2.14E-04	2.18E-04	1.14E-03	2.94E-03	9.53E-03	2.45E-02	5.02E-04	4.17E-04	2.49E-04	2.68E-04
Rh-103m	1.41E-08	2.37E-08	1.23E-08	1.23E-08	9.51E-05	5.86E-05	3.33E-05	5.28E-06	1.70E-08	1.68E-08	1.23E-08	1.52E-08
Tc-104	1.70E-05	5.37E-06	9.07E-07	5.14E-06	2.30E-03	5.03E-04	1.35E-04	2.18E-05	1.84E-05	1.12E-05	1.37E-06	7.32E-06
Mo-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tc-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-105 Rh-105	5.44E-05 2.43E-05	3.94E-05 3.02E-05	4.81E-06 1.05E-05	1.44E-05 1.23E-05	1.84E-03 7.20E-04	2.75E-03 1.62E-03	5.89E-03 7.16E-03	4.92E-03 1.41E-02	9.61E-05 4.06E-05	6.79E-05 3.04E-05	6.23E-06 1.11E-05	2.03E-05 1.41E-05
Rh-105m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	5.44E-03	5.44E-03	5.29E-03	5.27E-03	1.16E-02	2.05E-02	9.46E-02	2.66E-01	5.48E-03	5.44E-03	5.35E-03	5.35E-03
Rh-106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107	3.76E-08	5.46E-07	3.76E-08	3.76E-08	3.96E-05	9.84E-05	5.98E-04	1.75E-03	2.48E-05	1.28E-05	3.76E-08	3.76E-08
Rh-109	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-109	8.92E-07	4.70E-06	3.51E-07	4.06E-07	1.79E-03	3.70E-03	1.33E-02	1.73E-02	2.49E-05	1.35E-05	3.54E-07	5.05E-07
Ag-109m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ag-110m	6.85E-03	3.19E-03	1.27E-03	2.12E-03	6.37E-03	1.29E-02	2.31E-02	4.27E-02	6.05E-03	2.81E-02	1.71E-03	3.65E-03
Ag-111	7.54E-05	7.48E-05	6.35E-05	6.51E-05	1.60E-03	3.68E-03	2.07E-02	5.52E-02	8.10E-05	2.17E-03	6.41E-05	6.77E-05
Cd-113m Cd-115m	1.30E-02 6.68E-04	1.30E-02 6.25E-04	1.30E-02 6.11E-04	1.30E-02 6.16E-04	1.38E-02 3.24E-03	1.49E-02 6.83E-03	2.45E-02 3.76E-02	4.68E-02 1.07E-01	2.09E+00 9.57E-02	3.60E-01 1.66E-02	1.30E-02 6.13E-04	1.30E-02 6.25E-04
Sn-123	1.22E-04	2.54E-03	1.20E-04	1.19E-04	2.35E-03	5.57E-03	3.32E-02	9.67E-02	1.23E-04	1.22E-04	1.20E-04	1.20E-04
Sb-124	1.44E-03	1.01E-02	6.75E-04	6.28E-04	4.03E-03	9.74E-03	3.16E-02	8.08E-02	1.70E-03	2.36E-03	6.92E-04	8.42E-04
Sn-125	1.11E-04	9.26E-04	3.72E-05	4.81E-05	3.79E-03	9.31E-03	5.05E-02	1.37E-01	1.86E-04	1.37E-04	3.86E-05	5.81E-05
Sb-125	1.58E-03	3.36E-02	9.72E-04	7.67E-04	1.83E-03	3.62E-03	9.39E-03	2.30E-02	1.42E-03	2.91E-03	9.58E-04	1.06E-03
Te-125m	2.83E-04	7.32E-02	2.61E-04	2.05E-04	7.37E-04	1.27E-03	5.93E-03	1.64E-02	3.02E-03	2.22E-04	2.15E-04	2.38E-04
Sn-126	3.45E-03	2.00E-02	2.63E-03	1.71E-03	6.00E-03	1.59E-02	5.99E-02	1.63E-01	3.27E-03	2.65E-03	2.30E-03	2.33E-03
Sb-126	1.32E-03	3.92E-03	4.34E-04	4.44E-04	4.46E-03	1.17E-02	2.97E-02	6.74E-02	1.91E-03	1.88E-03	4.55E-04	6.48E-04
Sb-127 Te-127	2.70E-04 1.68E-05	1.10E-03 3.81E-05	1.04E-04 1.63E-05	1.16E-04 1.64E-05	2.14E-03 9.05E-04	5.36E-03 1.30E-03	2.55E-02 3.99E-03	6.69E-02 4.21E-03	4.15E-04 5.09E-05	5.27E-04 1.69E-05	1.08E-04 1.64E-05	1.48E-04 1.65E-05
Te-127m	5.53E-04	1.19E-01	5.31E-04	4.92E-04	9.03E-04 9.32E-04	1.58E-03	1.12E-02	3.87E-02	8.50E-03	5.02E-04	5.01E-04	5.15E-04
Sb-129	9.75E-05	1.06E-04	1.22E-05	2.98E-05	2.68E-03	4.83E-03	1.06E-02	6.67E-03	1.65E-04	1.27E-04	1.51E-05	4.04E-05
Te-129	3.38E-06	3.14E-06	1.98E-06	2.25E-06	1.47E-03	9.63E-04	6.60E-04	1.29E-04	4.45E-06	3.17E-06	2.02E-06	2.47E-06
Te-129m	9.34E-04	4.60E-02	8.53E-04	8.10E-04	2.57E-03	5.05E-03	2.98E-02	8.47E-02	1.28E-02	8.56E-04	8.36E-04	8.49E-04
I-129	4.56E-04	1.48E-03	5.28E-04	4.22E-04	7.38E-04	4.67E-04	8.33E-04	1.59E-03	4.47E-04	4.53E-04	5.28E-04	5.69E-04
Sn-130	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sn-130m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-130	2.78E-04	2.93E-04	2.62E-04	1.87E-04	2.17E-03	3.40E-04	4.34E-04	4.86E-04	2.60E-04	2.42E-04	2.93E-04	2.63E-04
Sb-131	2.37E-05	1.06E-05	1.76E-06	6.87E-06	1.73E-03	7.57E-04	3.44E-04	8.42E-05	2.78E-05	1.68E-05	2.37E-06	1.02E-05
Te-131 Te-131m	5.74E-06 4.57E-04	3.19E-06 1.86E-03	1.44E-06 2.09E-04	1.90E-06 2.11E-04	1.22E-03 2.49E-03	3.71E-04 5.02E-03	1.13E-04 1.64E-02	1.80E-05 2.93E-02	6.40E-06 1.11E-03	4.02E-06 4.98E-04	1.56E-06 2.32E-04	2.99E-06 2.74E-04
I-131	1.87E-04	4.88E-04	5.32E-04	2.11E-04 2.18E-04	1.12E-03	2.00E-04	3.28E-04	6.01E-04	1.70E-04	1.81E-04	5.45E-04	3.82E-04
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-132m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Te-132	1.12E-03	4.25E-03	7.18E-04	6.74E-04	2.83E-03	5.70E-03	2.76E-02	7.16E-02	1.84E-03	1.20E-03	8.18E-04	8.37E-04
I-132	1.31E-04	9.51E-05	7.15E-05	7.46E-05	2.34E-03	1.73E-04	1.95E-04	1.40E-04	1.22E-04	1.05E-04	8.28E-05	9.45E-05
Sb-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nuclido	Muscle	Overies	Panerose	P Marrow	Skin	Spleen	Tostos	Thymus	Thyroid	Utorue	Bld Wall	Eff Dose
Nuclide Tc-103	Muscle 0.00E±00	Ovaries 0.00F±00	Pancreas 0.00E±00	R Marrow	Skin 0.00E±00	Spleen 0.00E±00	Testes 0.00F±00	Thymus	Thyroid	Uterus 0.00F±00	Bld Wall	Eff Dose
Tc-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tc-103 Ru-103	0.00E+00 4.43E-04	0.00E+00 2.12E-03	0.00E+00 4.96E-04	0.00E+00 5.95E-04	0.00E+00 2.59E-04	0.00E+00 4.27E-04	0.00E+00 4.21E-04	0.00E+00 2.61E-04	0.00E+00 2.49E-04	0.00E+00 1.10E-03	0.00E+00 8.93E-04	0.00E+00 2.72E-03
Tc-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tc-103 Ru-103 Rh-103m	0.00E+00 4.43E-04 3.02E-08	0.00E+00 2.12E-03 1.66E-07	0.00E+00 4.96E-04 1.19E-07	0.00E+00 5.95E-04 1.82E-08	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00	0.00E+00 4.27E-04 3.45E-08	0.00E+00 4.21E-04 1.23E-08	0.00E+00 2.61E-04 1.23E-08	0.00E+00 2.49E-04 1.23E-08	0.00E+00 1.10E-03 6.06E-08	0.00E+00 8.93E-04 3.25E-08	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 9.79E-04
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 9.79E-04 1.36E-03
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 9.79E-04 1.36E-03 0.00E+00
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105m Ru-106	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105m Ru-106 Rh-106	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 9.79E-04 1.36E-03 0.00E+00
Tc-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105m Ru-106	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-105 Rh-106 Rh-106 Rh-106 Pd-107 Rh-109 Pd-109	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 3.76E-08	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 2.76E-05	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 3.76E-08	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-03 0.00E+00 6.53E-07	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 6.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 0.00E+00 5.41E-03 0.00E+00 3.76E-08 0.00E+00 8.14E-07	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-03 0.00E+00 3.76E-03 3.84E-07	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 3.76E-08	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 4.50E-07	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 2.03E-03
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105m Ru-106 Rh-107 Rh-109 Pd-107 Rh-109 Pd-109	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+0	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 2.76E-05 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 2.74E-06 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.87E-06	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 6.53E-07 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-08 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 6.41E-06 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-106 Rh-106 Rh-106 Rh-106 Pd-107 Rh-109 Pd-109 Ag-109m Ag-110m	0.00E+00 4.43E-04 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 2.19E-06 3.50E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-08 0.00E+00 2.76E-05 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 3.76E-08 0.00E+00 2.74E-06 0.00E+00 6.73E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.87E-06 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-08 0.00E+00 1.59E-08	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 8.14E-07 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 1.24E-05 1.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-03	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 6.41E-05	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 2.03E-03 0.00E+00
Tc-103 Ru-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-1111	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 2.19E-06 0.00E+00 3.50E-03 7.57E-05	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 0.52E-03 0.00E+00 1.99E-03 6.72E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 0.00E+00 3.46E-03 7.42E-05	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 0.00E+00 5.41E-03 0.00E+00 3.76E-08 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-03	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 0.11E-05 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+00 1.71E-03 6.41E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-03	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.33E-03 0.00E+00
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-1111 Cd-113m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+0 3.50E-03 1.50E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 3.76E-08 0.00E+00 2.76E-05 0.00E+0 1.29E-02 1.60E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+00 1.71E-03 6.41E-05 1.30E-02	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+0 6.38E-06 1.09E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.03E-02 4.65E-03 8.50E-02
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-106 Rh-106 Rh-106 Rh-107 Rh-109 Pd-109 Ag-109m Ag-111 Cd-113m Cd-115m	0.00E+00 4.43E-04 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.56E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.87E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-08 0.00E+0 3.46E-03 7.42E-05 1.30E-02 6.52E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 1.24E-05 1.24E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+0 2.32E-03 6.52E-05 1.30E-02 6.17E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.93E-03 1.09E-04 1.30E-02 6.53E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.45E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 2.03E-03 0.00E+00 1.37E-04 0.00E+00 1.03E-03 8.50E-02 1.22E-02
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-1111 Cd-113m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+0 3.50E-03 1.50E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 3.76E-08 0.00E+00 2.76E-05 0.00E+0 1.29E-02 1.60E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+00 1.71E-03 6.41E-05 1.30E-02	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+0 6.38E-06 1.09E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.03E-02 4.65E-03 8.50E-02
Tc-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125	0.00E+00 4.43E-04 8.59E-06 0.00E+00 0.00E+00 0.00E+00 5.70E-05 0.00E+00 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.41E-03	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 2.76E-05 0.00E+0 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.46E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.23E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.87E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-03 0.00E+0 1.59E-03 0.00E+0 0.52E-05 1.30E-02 6.53E-07 0.00E+0 4.20E-05 1.30E-02 6.17E-04 1.20E-04 8.12E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-06 0.00E+01 3.76E-06 0.00E+04 1.59E-06 0.00E+04 1.59E-06 1.30E-02 1.22E-04 1.22E-04 1.22E-04 1.22E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 3.72E-05 1.30E-02 6.19E-04 1.28E-04 1.18E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 3.84E-07 0.00E+04 4.52E-05 1.30E-02 6.17E-04 1.20E-04 4.65E-05	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 3.86E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04	0.00E+00 8.93E-04 8.68E-06 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 4.50E-07 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03	0.00E+00 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 1.36E-03 1.00E+00 2.03E-03 0.00E+00 1.37E-02 4.65E-03 8.50E-02 1.22E-02 7.78E-03 9.42E-03
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Ag-110m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.61E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.94E-03 1.10E-03 2.96E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.62E-03 1.71E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+0 5.51E-03 0.00E+0 2.05E-07 0.00E+0 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 1.52E-03 0.00E+00 1.52E-05 1.30E-02 6.72E-05 1.30E-02 4.00E-04 8.00E-04 8.00E-04 8.12E-05 7.86E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 1.29E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04	0.00E+00 2.61E-04 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 4.65E-05 9.35E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05 9.58E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 1.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+0 0.45E-03 0.00E+0 6.41E-06 0.00E+0 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.38E-03 0.00E+00 1.32E-02 1.22E-02 7.78E-03 9.42E-03 1.14E-02 4.20E-03
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-109m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125 Te-125m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.15E-03 2.43E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.10E-03 2.96E-03 5.15E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 4.396E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.62E-03 1.71E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 1.29E-03 1.39E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.22E-04 1.18E-03 1.36E-04 9.48E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-03 1.09E-04 1.30E-02 6.53E-04 1.31E-04 1.34E-03 5.05E-04	0.00E+00 8.93E-04 3.25E-08 6.86E-06 0.00E+00 1.09E-04 4.50E-03 0.00E+00 6.45E-03 0.00E+00 6.45E-03 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.97E-04 1.97E-04 1.63E-03 5.74E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 2.03E-03 8.50E-02 1.22E-02 7.78E-03 9.42E-03 1.14E-02 4.20E-03 3.22E-03
Tc-103 Ru-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-109m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125 Te-125m Sn-126	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 0.00E+00 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.15E-03 2.43E-04 1.15E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.98E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 2.32E-04 1.43E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.46E-03 7.77E-04 5.51E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 4.00E-04 8.00E-04 2.04E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+0 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.32E-03 2.33E-04 2.66E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 1.94E-04 2.46E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 4.65E-05 9.35E-04 2.18E-04 2.18E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 3.86E-03	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 5.77E-03 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+04 1.30E-02 6.53E-04 1.31E-04 3.55E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.63E-03 4.45E-04	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 1.36E-03 8.50E-02 7.78E-03 9.42E-03 1.42E-03 1.42E-03 1.42E-03 1.42E-03 1.47E-02
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Ag-109 Ag-110m Ag-111 Cd-113m Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sn-126 Sb-126	0.00E+00 4.43E-04 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.61E-04 1.15E-03 2.43E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 6.94E-03 1.10E-03 5.15E-04 9.31E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 2.32E-04 3.17E-03 1.80E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04 2.00E-04 2.00E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.46E-03 1.59E-06 0.00E+0 3.46E-03 1.39E-04 1.29E-03 1.39E-04 1.29E-03 1.39E-04 1.38E-04 1.29E-03 1.39E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 1.94E-04 1.94E-04 1.94E-04 1.94E-04 1.94E-04 1.94E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 4.65E-05 9.35E-04 2.18E-04 2.18E-04 2.06E-03 5.08E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.85E-03 2.30E-03 2.30E-03	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 1.09E-04 1.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.22E-03 4.93E-03	0.00E+00 8.93E-04 8.93E-04 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.53E-03 5.74E-04 4.21E-03 3.94E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.03E-03 0.00E+00 1.03E-03 0.00E+00 1.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-04 0.00E+00 3.37E-02 3.22E-03 3.22E-03 3.22E-03 3.77E-02 9.11E-03
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125 Sb-125 Sb-126 Sb-127	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.15E-03 2.43E-04 2.99E-03 1.58E-03 3.46E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.40E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 4.396E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 2.32E-04 3.17E-03 3.18E-03 3.17E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 3.39E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 2.00E-04 2.00E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.32E-03 1.39E-03 1.39E-03 1.39E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.22E-04 1.22E-04 1.38E-03 1.36E-04 2.46E-03 1.33E-03 1.33E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.6E-03 5.08E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-03 2.30E-03 4.55E-04 1.08E-04	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 1.02E-04 1.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-03 1.09E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.45E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.63E-03 3.445E-04 4.21E-03 3.94E-03 1.07E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 2.38E-03 3.00E+00 1.03E-02 4.65E-03 8.50E-02 1.22E-02 4.20E-03 1.14E-02 4.17E-03 9.11E-03 6.18E-03
Tc-103 Ru-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-1110m Ag-1111 Cd-113m Cd-115m Sh-124 Sb-124 Sh-125 Sb-125 Te-125m Sh-126 Sb-126 Sb-127 Te-127	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 0.00E+00 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.61E-04 1.15E-03 2.43E-04 1.15E-03 2.43E-04 1.15E-03 3.46E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 6.98E-04 9.31E-03 1.04E-02 2.18E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 3.23E-04 1.43E-03 3.96E-04 1.74E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 3.39E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 0.528E-03 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 4.00E-04 7.86E-04 2.04E-03 7.20E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.38E-03 3.38E-04 1.38E-03 3.38E-04 1.38E-03 3.38E-04 1.38E-03 3.44E-03 3.44E-03 3.45E-03 3.38E-04 1.38E-04 1.38E-03 3.44E-03 1.39E-04 1.34E-03 1.34E-04 1.34E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.20E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 1.94E-04 2.46E-03 1.33E-03 2.95E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 2.18E-04 2.18E-04 2.06E-03 5.08E-04 1.22E-04 1.22E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 6.92E-04 4.86E-05 9.58E-04 1.08E-04 6.92E-04 1.08E-04 6.92E-04 1.08E-04	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-06 1.30E-02 6.53E-04 1.31E-04 3.45E-03 2.51E-04 1.84E-03 1.06E-03 1.06E-03	0.00E+00 8.93E-04 8.93E-04 6.86E-06 0.00E+00 1.09E-00 1.09E-00 0.00E+00 4.50E-07 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 6.41E-06 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.63E-03 3.94E-03 1.07E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.32E-03 0.00E+00 0.0
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125 Sb-125 Sb-126 Sb-127	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.15E-03 2.43E-04 2.99E-03 1.58E-03 3.46E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.40E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 4.396E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 2.32E-04 3.17E-03 3.18E-03 3.17E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 3.39E-03	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 8.00E-04 2.00E-04 2.00E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.32E-03 1.39E-03 1.39E-03 1.39E-03	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.22E-04 1.22E-04 1.38E-03 1.36E-04 2.46E-03 1.33E-03 1.33E-03	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.6E-03 5.08E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-03 2.30E-03 4.55E-04 1.08E-04	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 1.02E-04 1.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-03 1.09E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.45E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.63E-03 3.445E-04 4.21E-03 3.94E-03 1.07E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 2.38E-03 3.00E+00 1.03E-02 4.65E-03 8.50E-02 1.22E-02 4.20E-03 1.14E-02 4.17E-03 9.11E-03 6.18E-03
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Rh-107 Rh-109 Ag-109m Ag-110m Ag-1111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sn-126 Sb-127 Te-127m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 3.76E-08 1.30E-02 6.29E-04 1.41E-03 1.61E-04 2.99E-03 3.46E-04 1.68E-03 3.46E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03 2.96E-03 2.18E-03 2.18E-03 2.18E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+0 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.62E-03 1.71E-04 1.74E-05 1.80E-03	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.53E-07 0.00E+0 4.20E-04 8.00E-04 8.00E-04 8.00E-04 4.20E-04 2.00E-04 1.74E-04 1.74E-04 1.65E-05 4.91E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.29E-03 1.39E-04 1.31E-03 2.33E-04 1.31E-03 3.14E-04 1.51E-05 5.07E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 1.94E-04 2.46E-03 2.95E-04 1.66E-05 4.84E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 3.84E-07 0.00E+00 2.32E-03 1.30E-02 6.17E-04 4.65E-05 9.35E-04 2.18E-04 2.06E-03 5.08E-04 1.22E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+0 3.76E-08 0.00E+0 4.20E-04 6.22E-04 4.386E-05 9.58E-04 3.85E-03 2.30E-03 4.55E-04 1.08E-04 6.24E-05	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+0 6.38E-06 1.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 4.93E-03 1.06E-03	0.00E+00 8.93E-04 8.93E-04 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 4.21E-03 3.94E-03 1.07E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.03E-03 0.00E+00 1.03E-03 3.00E+00 1.4E-03 3.50E-03 3.22E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04
Tc-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Rh-107 Rh-109 Ag-109m Ag-110m Ag-1111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sn-126 Sb-127 Te-127 Te-127 Te-127 Sb-129 Te-129 Te-129m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 3.76E-08 1.30E-02 6.29E-04 1.41E-03 1.61E-04 2.99E-03 3.46E-04 1.68E-03 5.15E-04 9.78E-05	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 1.94E-04 1.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03 2.10E-05 6.20E-04 5.85E-04 7.07E-06	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 6.73E-08 0.00E+00 6.73E-08 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 1.71E-04 3.17E-03 3.96E-04 1.74E-05 5.12E-04 2.26E-04 7.12E-06 8.91E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.67E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05 3.04E-02 1.58E-04	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 2.00E-04 2.00E-04 4.00E-04 1.74E-04 1.74E-04 4.37E-05 2.29E-06 8.15E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.66E-03 7.42E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 1.29E-03 1.39E-04 1.71E-05 5.07E-04 1.53E-04 5.10E-06	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 1.94E-04 2.46E-03 2.95E-04 1.66E-05 4.84E-04 4.91E-05 2.19E-06	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 4.65E-05 9.35E-04 2.18E-04 2.18E-04 1.20E-04 1.20E-04 1.20E-04 2.18E-04 2.18E-04 2.18E-04 3.08E-04 3.18E-04 3.08E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.56E-03 0.00E+00 3.54E-07 0.00E+0 4.386E-07 1.30E-02 6.13E-04 4.20E-04 4.86E-05 9.58E-04 3.85E-03 2.30E-03 4.55E-04 1.08E-04 6.24E-05 1.13E-02 1.51E-05 2.77E-06	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+0 4.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.22E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-04 5.70E-06	0.00E+00 8.93E-04 8.93E-04 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 4.21E-03 1.07E-03 1.23E-04 1.32E-04 1.32E-04	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.38E-03 3.00E+00 1.38E-03 3.20E-03 3.22E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-04 6.86E-03 6.18E-03 6.18E-03 6.18E-03 6.18E-03 1.57E-03 2.33E-04
Tc-103 Ru-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-109m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-125 Te-125m Sn-126 Sb-127 Te-127m Sb-129 Te-129 Te-129 Te-129 Te-129	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.41E-03 1.56E-04 1.58E-03 1.56E-04 1.68E-05 5.15E-04 1.68E-05 6.16E-04 1.68E-05 6.59E-06	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+01 1.94E-04 1.30E-02 1.60E-04 1.30E-02 1.60E-04 1.30E-02 1.60E-04 1.30E-02 1.60E-04 1.30E-02 2.98E-03 1.10E-03 2.96E-03 1.10E-03 2.96E-03 1.10E-03 2.96E-03 1.10E-04 1.10E-03 2.96E-04 1.10E-03 2.96E-04 1.10E-03 2.96E-04 1.10E-03 2.96E-04 1.10E-03 2.10E-05 6.20E-04 7.07E-06 1.15E-03 4.74E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 1.71E-04 1.43E-03 1.80E-02 3.96E-04 1.74E-05 5.12E-04 7.12E-06 8.91E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.57E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 3.74E-05 3.04E-02 3.39E-03 3.74E-05 3.04E-02 3.95E-04 3.50E-06	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 0.00E+00 5.28E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.02E-05 7.86E-04 2.00E-04 2.04E-03 7.20E-04 1.74E-04 1.65E-05 4.91E-04 4.37E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.22E-04 1.23E-03 1.39E-03 1.39E-03 1.39E-03 1.39E-03 1.39E-03 1.39E-04 1.71E-05 5.07E-04 1.71E-05 5.07E-04 4.55E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 3.76E-08 1.00E+00 4.11E-07 0.00E+00 4.14E-07 1.00E+00 4.14E-07 1.30E-02 4.18E-03 1.33E-03 1.33E-03 1.33E-03 1.33E-04 1.94E-04 1.46E-03 1.33E-04 1.94E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 0.00E+00 3.36E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.59E-05 5.01E-04 1.22E-04 1.64E-05 5.01E-04 6.36E-05	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 3.86E-05 9.58E-04 3.85E-03 2.30E-03 4.55E-04 1.38E-04 1.38E-04 1.38E-05 1.13E-02 1.51E-05 1.13E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+01 3.76E-08 0.00E+01 3.76E-08 0.00E+01 3.76E-08 0.00E+01 3.76E-08 0.00E+01 0.38E-06 0.00E+01 0.38E-06 0.00E+01 0.38E-06 0.38E-06 0.38E-06 0.38E-06 0.38E-06 0.38E-06 0.38E-06 0.38E-03 1.89E-03 1.84E-03 1.84E-03 1.84E-05 5.18E-04 5.70E-06 9.47E-04	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 4.50E-07 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.97E-04 1.98E-03 5.74E-04 4.21E-03 3.94E-03 1.23E-04 1.32E-04 1.32E-04 1.32E-04 1.32E-04 1.32E-04 1.32E-03 1.23E-04 1.02E-05 2.59E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.36E-03 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 1.36E-03 0.00E+00 1.32E-02 4.65E-03 8.50E-02 1.22E-02 7.78E-03 9.42E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-02 9.11E-03 6.24E-04 8.66E-03 1.57E-03 2.33E-04 1.10E-02
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Rh-109 Ag-110m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sh-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-129 Te-129 Te-129 Te-129 Te-129 Sh-130	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.58E-03 3.46E-04 1.78E-05 5.15E-04 9.78E-05 5.15E-04 1.11E-03 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 5.15E-04 9.31E-03 1.04E-02 2.18E-03 5.15E-04 5.85E-04 7.07E-06 1.15E-03	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 2.32E-04 1.43E-03 3.96E-04 1.43E-03 3.96E-04 1.43E-03 4.17E-03 1.71E-04 4.62E-04 4.62E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05 3.04E-02 1.58E-04 3.50E-06 1.96E-02 5.19E-04	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 1.79E-05 1.30E-02 6.17E-04 1.20E-04 8.10E-04 2.04E-03 7.20E-04 1.74E-04 1.74E-04 1.75E-05 4.91E-04 1.75E-05	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 1.33E-04 1.31E-03 2.33E-04 1.31E-05 5.07E-04 1.51E-06 8.67E-04 4.55E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 1.94E-04 4.91E-05 4.84E-04 4.91E-05 4.84E-04 4.91E-05 4.87E-04 4.90E-06 8.27E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.06E-03 5.08E-04 1.22E-04 1.22E-04 6.36E-05 5.01E-04 6.36E-06	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05 9.58E-04 1.86E-05 1.38E-02 1.51E-05 1.31E-02 1.51E-05 1.70E-02 7.81E+00 1.70E-02 7.81E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 4.38E-06 0.00E+00 4.38E-06 0.00E+00 4.345E-03 5.05E-04 1.31E-04 3.45E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03 1.06E-04 5.22E-03 4.93E-03	0.00E+00 8.93E-04 8.98E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+0 0.45E-03 0.00E+0 6.45E-03 0.00E+0 6.41E-06 0.00E+0 6.41E-06 0.00E+0 4.50E-07 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.63E-03 1.77E-04 3.94E-03 1.07E-03 1.23E-04 1.32E-03 1.23E-04 1.32E-03 1.25E-03 1.59E-03 1.59E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.32E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-03 3.22E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04 8.66E-03 1.57E-03 2.33E-04 1.10E-02 3.91E-01
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Rh-107 Rh-109 Ag-109m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sn-126 Sb-127 Te-127 Te-127 Te-127 Sb-129 Te-129 Te-129 Te-129 I-129 Sn-130 Sn-130m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+0 3.50E-03 1.30E-02 6.29E-04 1.41E-03 1.61E-04 1.49E-03 3.46E-04 1.68E-05 5.15E-04 9.78E-05 2.95E-06	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 1.94E-04 1.00E+00 6.21E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.10E-03 2.96E-03 5.15E-04 9.31E-03 2.10E-05 6.20E-04 5.85E-04 7.07E-06 1.15E-03 4.74E-04 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 6.73E-08 0.00E+00 6.73E-08 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 1.71E-04 1.74E-05 5.12E-04 2.26E-04 7.12E-06 8.91E-04 4.62E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 3.39E-03 1.10E-03 3.74E-05 3.04E-02 1.58E-04 3.05E-02	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.00E-04 8.12E-05 7.86E-04 2.00E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 1.71E-05 5.07E-04 1.53E-04 5.07E-04 4.55E-04 4.55E-04 4.55E-04 4.55E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.28E-04 1.18E-03 1.36E-04 2.46E-03 1.33E-04 1.94E-04 2.46E-03 2.95E-04 4.91E-05 2.19E-06 8.27E-04 4.30E-04 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 4.65E-05 9.35E-04 2.18E-04 0.06E+03 5.08E-04 1.22E-04 1.22E-04 1.22E-04 0.06E-03 5.08E-04 0.06E-03 0.06E-04 0.06E+00 0.06E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.54E-07 0.00E+0 1.71E-03 2.30E-03 2.30E-03 2.30E-03 4.55E-04 1.88E-04 3.85E-04 1.88E-04 1.88E-05 1.77E-06 1.70E-02 7.81E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+0 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.22E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-04 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.96E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 4.21E-03 5.74E-04 4.21E-03 1.07E-03 1.23E-04 1.02E-05 2.59E-03 1.59E-03 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.38E-03 3.00E+00 1.38E-03 3.20E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-04 0.00E+00 1.33E-03 1.77E-04 0.00E+00 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Ag-1109 Ag-1109 Ag-1109 Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-126 Sb-126 Sb-127 Te-127m Te-127m Te-129m Te-129m Te-1300 Sn-1300 Sn-1300	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.58E-03 3.48E-04 1.68E-05 5.15E-04 9.78E-05 2.95E-06 8.66E-04 1.11E-03 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 2.96E-03 1.06E-04 6.94E-03 1.10E-03 2.96E-03 4.74E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 3.96E-04 1.43E-03 3.96E-04 1.74E-05 5.12E-04 7.12E-06 8.91E-04 4.62E-04 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 0.00E+00 2.05E-07 0.00E+00 2.05E-07 0.00E+00 4.50E-06 0.00E+00 4.50E-07 0.00E+00 2.87E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05 3.04E-02 1.58E-04 3.50E-06 1.96E-02 5.19E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.00E-04 2.04E-03 7.20E-04 1.74E-04 1.74E-04 1.74E-04 1.75E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.59E-06 0.00E+0 1.59E-06 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.22E-03 1.39E-03 3.31E-04 1.71E-05 5.07E-04 4.55E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 1.94E-04 2.46E-03 1.33E-03 2.95E-04 1.66E-05 4.84E-04 4.91E-05 2.19E-06 8.27E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 2.18E-04 2.48E-04 2.48E-04 2.66E-05 5.01E-04 1.20E-04 1.20E-04 1.20E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 3.86E-05 9.58E-04 0.85E-03 2.30E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00 0.00E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+00 4.345E-03 1.09E-04 1.31E-04 3.45E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03 1.84E-05 5.18E-04 5.70E-06 9.47E-04 4.66E-04 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 6.86E-06 0.00E+00 1.09E-00 1.09E-00 6.45E-03 0.00E+00 4.50E-07 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.63E-03 3.94E-03 1.07E-03 1.23E-04 1.23E-04 1.22E-05 2.59E-03 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.00E+00 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.32E-02 4.65E-03 8.50E-02 1.22E-02 7.78E-03 9.42E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04 8.66E-03 1.57E-03 2.33E-04 1.10E-02 3.91E-01 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Ag-110m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sh-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-129 Te-129 Te-129 Te-129 Te-129 Te-130 Sn-130 Sn-130 Sn-130 Sh-131	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 2.43E-04 1.41E-03 2.43E-04 1.58E-03 3.46E-04 9.78E-05 5.15E-04 9.78E-05 6.86E-04 1.11E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+0 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 5.15E-04 9.31E-03 1.04E-02 2.18E-03 5.15E-04 5.85E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 5.51E-03 0.00E+00 6.73E-03 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 2.32E-04 1.44E-05 5.12E-04 2.26E-04 1.74E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+0 5.51E-03 0.00E+0 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 1.58E-04 1.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 1.99E-03 6.52E-07 1.30E-02 6.17E-04 1.20E-04 8.12E-05 7.86E-04 2.04E-03 7.20E-04 1.74E-04 1.55E-05 4.91E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+01 3.9E-06 1.59E-06 1.59E-06 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.23E-04 1.33E-04 1.33E-04 1.34E-04 1.31E-05 5.07E-04 1.51E-06 8.67E-04 4.55E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 4.91E-05 4.84E-04 4.91E-05 2.19E-06 8.27E-04 4.30E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.06E-03 5.08E-04 1.22E-04 1.22E-04 6.36E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 1.08E-04 6.24E-05 1.13E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.26E-01	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03 1.06E-03 1.06E-04 1.34E-05 5.18E-04 3.66E-04 4.66E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.86E-06 0.00E+00 1.09E-00 1.09E-04 8.07E-05 0.00E+0 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 1.74E-04 4.21E-03 3.94E-03 1.23E-04 1.32E-03 1.23E-04 1.32E-03 1.59E-03 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 3.36E-03 8.50E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-03 3.22E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04 1.10E-02 3.91E-01 0.00E+00 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-107 Rh-109 Ag-109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sh-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-127 Sh-129 Te-129 Te-129 I-130 Sh-130 Sh-131 Te-131	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 2.19E-06 0.00E+00 3.50E-03 1.50E-03 1.61E-04 1.23E-04 1.23E-04 1.25E-03 3.46E-04 1.68E-05 5.15E-04 9.78E-05 2.95E-06 8.66E-04 1.11E-03 0.00E+00 3.00E+00 3.15E-04 9.78E-05 2.95E-06	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 6.21E-03 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 6.94E-03 1.10E-03 2.96E-03 2.96E-03 2.16E-05 6.20E-04 1.36E-04 6.31E-03 1.04E-02 2.18E-03 4.74E-04 0.00E+00 3.33E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 6.73E-08 0.00E+00 6.73E-08 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.23E-04 1.23E-04 1.43E-03 1.71E-04 1.74E-05 5.12E-04 2.26E-04 4.62E-04 4.62E-04 4.62E-04 4.62E-04 4.62E-04 4.62E-04 8.17E-05	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 1.0E-03 3.74E-05 3.93E-04 1.58E-04 1.58E-04 1.58E-04 0.00E+00 2.82E-04 1.56E-02 5.19E-04 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.00E-04 8.12E-05 7.86E-04 2.00E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 1.88E-04	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+0 1.59E-06 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.23E-05 1.39E-06 0.00E+00 3.46E-03 3.14E-04 1.71E-05 5.07E-04 1.53E-04 4.55E-04 4.55E-04 4.55E-04 5.00E+00 3.46E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 5.41E-03 0.00E+00 5.41E-03 0.00E+00 8.14E-07 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.22E-04 1.18E-03 1.36E-04 9.48E-04 1.94E-04 4.66E-03 1.39E-04 4.91E-05 2.19E-06 8.27E-04 4.30E-04 0.00E+00 2.38E-04 0.00E+00 2.38E-04 0.00E+00 2.38E-04	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 1.24E-05 1.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 1.20E-04 1.20E-04 1.20E-04 0.00E+00 3.94E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.56E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 4.20E-04 3.85E-03 2.30E-03 4.55E-04 1.88E-04	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+0 1.30E-02 6.53E-04 1.31E-04 3.45E-03 5.05E-04 1.34E-03 2.51E-04 5.22E-03 1.06E-03 1.06E-03 1.06E-04 0.00E+00 4.24E-04 4.66E-04 0.00E+00 4.24E-04	0.00E+00 8.93E-04 8.96E-08 6.86E-06 0.00E+00 1.09E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+0 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.97E-04 3.18E-03 1.07E-03	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 2.03E-03 0.00E+00 1.37E-04 1.36E-03 8.50E-02 4.65E-03 8.50E-02 4.65E-03 8.50E-02 4.78E-03 3.22E-02 7.78E-03 3.22E-03 1.77E-02 9.11E-03 6.24E-04 8.66E-03 1.57E-03 2.33E-04 1.10E-02 3.91E-01 0.00E+00 7.27E-03 3.82E-04
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Ag-110m Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Te-125m Sh-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-129 Te-129 Te-129 Te-129 Te-129 Te-130 Sn-130 Sn-130 Sn-130 Sh-131	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 2.43E-04 1.41E-03 2.43E-04 1.58E-03 3.46E-04 9.78E-05 5.15E-04 9.78E-05 6.86E-04 1.11E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+0 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 5.15E-04 9.31E-03 1.04E-02 2.18E-03 5.15E-04 5.85E-04	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 5.51E-03 0.00E+00 6.73E-03 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.43E-03 2.32E-04 1.44E-05 5.12E-04 2.26E-04 1.74E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 8.15E-05 4.58E-05 0.00E+0 5.51E-03 0.00E+0 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 1.58E-04 1.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 1.99E-03 6.52E-07 1.30E-02 6.17E-04 1.20E-04 8.12E-05 7.86E-04 2.04E-03 7.20E-04 1.74E-04 1.55E-05 4.91E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+01 3.9E-06 1.59E-06 1.59E-06 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.23E-04 1.33E-04 1.33E-04 1.34E-04 1.31E-05 5.07E-04 1.51E-06 8.67E-04 4.55E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 9.48E-04 4.91E-05 4.84E-04 4.91E-05 2.19E-06 8.27E-04 4.30E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-03 6.52E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.06E-03 5.08E-04 1.22E-04 1.22E-04 6.36E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 1.08E-04 6.24E-05 1.13E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.26E-01	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 2.51E-04 5.22E-03 4.93E-03 1.06E-03 1.06E-03 1.06E-04 1.34E-05 5.18E-04 3.66E-04 4.66E-04 0.00E+00 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.86E-06 0.00E+00 1.09E-00 1.09E-04 8.07E-05 0.00E+0 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 1.74E-04 4.21E-03 3.94E-03 1.23E-04 1.32E-03 1.23E-04 1.32E-03 1.59E-03 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 3.36E-03 8.50E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-03 3.22E-03 1.14E-02 4.20E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04 1.10E-02 3.91E-01 0.00E+00 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-125 Sb-125 Te-125m Sn-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-129 Te-129 Te-129 Sn-130 Sn-130 Sh-131 Te-131	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 0.00E+00 5.70E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.41E-03 1.56E-03 1.56E-03 1.56E-04 1.68E-05 5.15E-04 1.78E-05 2.95E-06 8.66E-04 1.11E-03 0.00E+00 3.01E-04 1.37E-05 5.18E-04 1.37E-05 5.18E-04 1.38E-05 5.18E-04 1.37E-05 5.18E-04 1.37E-05 5.18E-04	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 3.65E-04 1.94E-04 0.00E+03 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.46E-04 9.31E-03 1.00E-05 6.20E-04 6.98E-04 1.45E-04 9.31E-03 1.04E-02 2.18E-03 2.18E-03 2.01E-05 6.20E-04 7.07E-06 1.15E-03 4.74E-04 0.00E+00 3.33E-04 4.56E-05	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 1.71E-04 1.43E-03 1.80E-03 1.71E-04 1.47E-05 5.12E-04 2.26E-04 0.00E+00 4.51E-04 8.17E-05 6.61E-04 2.26E-04 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 2.57E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 3.74E-05 3.04E-02 3.99E-03 3.74E-06 1.96E-02 5.99E-04 0.00E+00 2.82E-04 1.56E-05 3.93E-04 0.00E+00 2.82E-04 1.56E-05 3.93E-06	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 0.00E+00 5.28E-03 0.00E+00 3.76E-08 0.00E+00 1.73E-05 1.30E-02 6.72E-05 1.30E-02 6.77E-04 1.20E-04 8.02E-05 7.86E-04 2.00E-04 8.12E-05 7.86E-04 2.00E-04 8.12E-05 7.86E-04 1.74E-04 1.74E-04 1.74E-04 1.74E-04 1.74E-04 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 0.00E+00 5.44E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.46E-03 1.39E-05 1.30E-02 6.52E-04 1.22E-04 1.23E-04 1.23E-04 1.23E-04 1.35E-04 0.00E+00 3.46E-03 1.39E-03 1.39E-03 1.39E-03 1.39E-03 1.39E-04 1.71E-05 5.07E-04 4.55E-04 0.00E+00 3.46E-04 5.19E-05 5.27E-04 1.98E-04 1.98E-04	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.60E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 3.76E-08 1.00E+00 3.76E-08 1.00E+00 3.76E-08 1.00E+00 4.14E-07 0.00E+00 4.18E-03 1.36E-04 9.48E-04 1.94E-04 1.94E-04 4.91E-05 2.19E-06 8.27E-04 4.30E-04 0.00E+00 2.38E-04 4.36E-04 4.36E-05 4.36E-06	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 0.00E+00 5.36E-03 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-04 0.00E+00 3.09E-05 2.20E-06 8.31E-04 6.36E-04 0.00E+00 3.09E-04 6.53E-04 6.53E-04 6.53E-04 6.53E-04 6.55E-04	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.33E-04 1.20E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 3.86E-05 1.31E-05 1.31E-05 1.31E-05 1.31E-05 1.30E-02 6.31E-05 1.31E-05 1.32E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 3.86E-05 9.58E-04 3.86E-05 1.31E-05 1.3	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+00 4.34E-03 5.05E-04 1.31E-04 3.45E-03 5.05E-04 1.84E-03 2.51E-04 5.70E-06 9.47E-04 4.66E-04 0.00E+00 4.24E-04 3.70E-05 8.00E-06 1.41E-03 2.19E-04	0.00E+00 8.93E-04 8.93E-04 8.68E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 4.50E-07 0.00E+00 4.50E-07 0.00E+00 4.50E-07 0.00E+00 4.51E-03 0.00E+04 4.21E-03 3.94E-03 1.23E-04 1.23E-04 1.25E-04 1.25E-03 0.00E+00 3.48E-03 1.82E-03 1.82E-03 1.82E-03 1.82E-03 1.82E-06 1.61E-03 2.80E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.00E+00 0.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 1.36E-03 8.50E-02 7.78E-03 8.50E-02 4.20E-03 3.22E-02 7.77E-03 3.22E-03 1.77E-02 9.11E-03 6.24E-04 1.10E-02 3.39E-04 1.10E-02 3.39E-01 0.00E+00 7.27E-03 3.8E-04 7.23E-03
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Pd-109 Ag-110m Ag-1111 Cd-113m Cd-115m Sh-125 Sb-125 Te-125m Sh-126 Sb-127 Te-127 Te-127 Te-127 Te-127 Te-127 Te-129 Te-129 Te-129 Te-129 Te-129 Te-129 Te-129 Te-130 Sh-130 Sh-131 Te-131 Te-131m I-131 Xe-131m I-131 Xe-131m I-131 Xe-131m I-131	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 0.00E+00 5.70E-05 3.28E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.41E-03 1.58E-03 3.46E-04 1.15E-03 2.49E-05 5.15E-04 1.58E-05 5.15E-04 1.11E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 5.15E-04 9.31E-03 1.04E-02 2.18E-03 4.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 6.00E+00 1.32E-04 1.23E-04	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 2.05E-07 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 6.25E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05 3.04E-02 1.58E-04 4.58E-04 3.50E-06 1.96E-02 5.19E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 0.528E-03 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.00E-04 2.04E-03 7.20E-04 1.74E-04 1.74E-04 1.74E-04 1.75E-05 4.91E-04 4.37E-05 2.29E-06 8.15E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.59E-06 0.00E+01 1.59E-06 1.59E-06 1.59E-06 1.59E-06 1.59E-06 1.59E-06 0.00E+00 3.46E-03 1.39E-04 1.22E-04 1.22E-04 1.22E-04 1.22E-04 1.23E-05 1.39E-06 6.52E-04 1.39E-06 6.52E-04 1.51E-05 5.07E-04 1.53E-04 5.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.32E-05 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.12E-05 5.01E-04 2.26E-05 6.31E-04 6.36E-03 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 6.92E-04 3.86E-05 9.58E-04 3.86E-05 1.36E-05 1.36E-02 1.51E-05 1.70E-02 7.81E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 4.38E-06 0.00E+00 4.38E-06 0.00E+00 4.34E-03 2.51E-04 3.45E-03 1.06E-03 1.06E-03 1.06E-04 5.22E-03 4.93E-03 1.06E-04 5.22E-03 4.93E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.86E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 6.45E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.63E-03 1.77E-04 3.18E-03 1.76E-04 1.32E-03 3.94E-03 1.07E-03 3.94E-03 1.23E-03 1.23E-04 1.32E-03 1.23E-04 1.32E-05 2.59E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 1.36E-03 0.00E+00 1.37E-04 1.20E-03 1.20E-03 1.20E-03 1.20E-03 1.20E-03 1.20E-03 1.27E-04 1.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Ag-109 Ag-110m Ag-111 Cd-113m Cd-113m Sh-124 Sn-125 Te-125m Sn-126 Sb-127 Te-127 Te-127 Te-127 Sb-129 Te-129 Te-129 I-129 I-130 Sn-130 Sn-130m I-130 Sh-131 Te-131 Te-131 Te-131 Sb-132 Sb-132m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.30E-02 6.29E-04 1.41E-03 1.61E-04 2.99E-03 3.46E-04 1.15E-03 2.45E-04 9.78E-05 5.15E-04 9.78E-05 3.83E-06 5.16E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 0.00E+00 0.62E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 1.10E-03 2.16E-04 9.31E-03 1.10E-03 2.16E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.04E-02 2.18E-03 2.01E-05 6.20E-04 5.85E-04 7.07E-06 1.15E-03 4.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.23E-04 1.23E-04 1.24E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 3.0E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 3.74E-05 3.39E-02 1.58E-04 3.50E-02 5.19E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04 4.20E-05 7.86E-04 2.00E-04 1.74E-04 1.65E-05 4.91E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 1.39E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 0.00E+00 3.44E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 4.94E-04 4.94E-06 6.06E-06 6.106E-06 6.13E-06 6.13E-06 6.13E-06 6.13E-06 6.13E-06 6.10E-06	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 2.32E-03 3.84E-07 0.00E+00 2.32E-03 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.59E-05 8.31E-04 6.36E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 4.86E-05 9.58E-04 3.85E-03 2.30E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+01 3.76E-08 0.00E+02 6.53E-04 1.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.86E-06 0.00E+00 0.00E+00 1.99E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.97E-04 3.18E-03 1.74E-04 1.63E-03 1.77E-04 1.63E-03 1.77E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.02E-05 2.59E-03 1.59E-03 1.59E-03 1.59E-03 1.59E-03 1.69E-05 8.78E-06 1.61E-03 2.80E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-02 1.22E-02 1.22E-03 3.22E-03 3.22E-03 3.22E-03 3.22E-03 3.22E-04 3.24E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Rh-105 Rh-105 Rh-106 Rh-106 Pd-107 Rh-109 Ag-1109 Ag-110m Ag-111 Cd-113m Cd-115m Sn-123 Sb-124 Sn-125 Sb-126 Sb-126 Sb-127 Te-127m Sb-129 Te-129m I-129 Sn-130 Sn-130 Sh-131 Te-131m I-131 Xe-131m Sb-132 Sb-132 Sb-131 Te-131m I-131 Xe-131m Sb-132 Sb-132 Sb-132 Sb-131 Te-131m I-131 Xe-131m Sb-132 Sb-132 Sb-132 Sb-132 Sb-132 Sb-131 Te-131m I-131 Xe-131m I-131 Te-132m Te-132	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 0.00E+00 5.42E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.50E-03 7.57E-05 1.30E-02 6.29E-04 1.23E-04 1.41E-03 1.58E-03 1.58E-03 1.58E-04 1.68E-05 5.15E-04 1.77E-05 1.38E-06 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 3.65E-04 1.94E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 2.98E-03 1.01E-03 2.96E-03 1.02E-04 0.00E+00 3.15E-04 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 1.32E-04 3.96E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 6.73E-03 8.08E-05 1.30E-02 6.59E-04 1.23E-04 1.43E-03 1.71E-04 1.43E-03 3.96E-04 1.74E-05 5.12E-04 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 0.00E+00 2.05E-07 0.00E+00 2.05E-07 0.00E+00 2.87E-06 0.00E+00 4.50E-03 8.28E-05 1.30E-02 6.39E-04 9.21E-04 4.45E-03 7.77E-04 5.51E-03 1.04E-02 3.39E-03 1.10E-03 3.74E-05 3.04E-02 3.99E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+04 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 2.32E-05 1.73E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 1.20E-04 8.02E-05 7.86E-04 2.04E-03 7.20E-04 1.74E-04 1.74E-04 1.74E-04 1.74E-04 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 0.00E+00 8.90E-05 3.19E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.46E-03 7.42E-05 1.30E-02 6.52E-04 1.22E-04 1.22E-04 1.23E-03 3.31E-04 1.29E-03 3.31E-04 1.71E-05 5.07E-04 6.57E-04 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.00E+00 3.33E-03 1.33E-03 1.33E-03 1.36E-04 4.94E-04 1.94E-04 2.46E-03 1.33E-03 1.36E-04 4.91E-05 2.19E-06 8.27E-04 0.00E+00 0.00E+00 0.38E-04 1.49E-04 1.49E-04 0.00E+00	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 3.84E-07 0.00E+00 2.32E-05 1.30E-02 6.17E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-04 1.20E-06 1.31E-04 1.20E-06 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 0.00E+00 6.23E-06 1.11E-05 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 3.86E-05 9.58E-04 1.20E-04 1.38E-03 2.30E-02 6.13E-05 1.31E-05 1.31E-05 1.31E-05 1.31E-05 1.30E-02 6.16E-05 9.58E-04 1.08E-04 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 0.224E-04 1.02E-04 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 4.34E-04 1.31E-04 3.45E-03 2.51E-04 1.34E-03 2.51E-04 1.36E-04 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.68E-06 0.00E+00 0.00E+00 1.09E-04 8.07E-05 0.00E+00 4.50E-07 0.00E+00 6.45E-03 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 1.83E-03 1.97E-04 1.23E-04 1.23E-04 1.23E-03 1.23E-04 1.25E-05 2.59E-03 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 0.00E+00 0.00E+00 1.36E-03 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.37E-04 0.00E+00 1.32E-02 4.65E-03 8.50E-02 1.22E-02 7.78E-03 9.42E-03 1.44E-02 4.20E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 6.24E-04 1.00E-00 0.00E+00
Tc-103 Ru-103 Ru-103 Ru-103 Rh-103m Tc-104 Mo-105 Tc-105 Ru-105 Rh-105 Rh-105 Rh-105 Rh-106 Pd-107 Rh-109 Ag-109 Ag-110m Ag-111 Cd-113m Cd-113m Sh-124 Sn-125 Te-125m Sn-126 Sb-127 Te-127 Te-127 Te-127 Sb-129 Te-129 Te-129 I-129 I-130 Sn-130 Sn-130m I-130 Sh-131 Te-131 Te-131 Te-131 Sb-132 Sb-132m	0.00E+00 4.43E-04 3.02E-08 8.59E-06 0.00E+00 5.70E-05 3.28E-05 0.00E+00 5.42E-03 0.00E+00 3.76E-08 0.00E+00 3.76E-08 1.30E-02 6.29E-04 1.41E-03 1.61E-04 2.99E-03 3.46E-04 1.15E-03 2.45E-04 9.78E-05 5.15E-04 9.78E-05 3.83E-06 5.16E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.12E-03 1.66E-07 2.20E-05 0.00E+00 0.00E+00 0.00E+00 0.62E-03 0.00E+00 2.76E-05 0.00E+00 1.29E-02 1.60E-04 1.30E-02 6.98E-04 1.30E-02 6.98E-04 1.30E-02 2.18E-03 1.10E-03 2.16E-04 9.31E-03 1.10E-03 2.16E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.15E-04 9.31E-03 1.04E-02 2.18E-03 2.01E-05 6.20E-04 5.85E-04 7.07E-06 1.15E-03 4.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.96E-04 1.19E-07 6.19E-05 0.00E+00 0.00E+00 1.32E-04 3.96E-05 0.00E+00 5.51E-03 0.00E+00 2.74E-06 0.00E+00 6.73E-03 1.30E-02 6.59E-04 1.23E-04 1.23E-04 1.23E-04 1.23E-04 1.24E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 5.95E-04 1.82E-08 8.98E-06 0.00E+00 0.00E+00 8.15E-05 4.58E-05 0.00E+00 5.51E-03 0.00E+00 2.05E-07 0.00E+00 4.50E-03 3.0E-02 6.39E-04 4.45E-03 7.77E-04 4.45E-03 7.77E-04 5.51E-03 3.74E-05 3.39E-02 1.58E-04 3.50E-02 5.19E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.59E-04 1.33E-08 4.05E-06 0.00E+00 0.00E+00 2.32E-05 1.73E-05 0.00E+00 5.28E-03 0.00E+00 6.53E-07 0.00E+00 1.99E-03 6.72E-05 1.30E-02 6.17E-04 8.00E-04 8.00E-04 8.00E-04 4.20E-05 7.86E-04 2.00E-04 1.74E-04 1.65E-05 4.91E-04 4.37E-05 2.29E-06 8.15E-04 5.24E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.27E-04 3.45E-08 3.91E-05 0.00E+00 8.90E-05 3.19E-05 0.00E+00 5.44E-03 0.00E+00 1.59E-06 0.00E+00 3.46E-03 1.39E-05 1.30E-02 6.52E-04 1.29E-03 1.39E-04 0.00E+00 3.44E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 4.21E-04 1.23E-08 2.19E-06 0.00E+00 0.00E+00 2.80E-05 2.67E-05 0.00E+00 3.76E-08 0.00E+00 3.76E-08 0.00E+00 2.55E-03 7.27E-05 1.30E-02 6.19E-04 1.18E-03 1.36E-04 4.94E-04 4.94E-06 6.06E-06 6.106E-06 6.13E-06 6.13E-06 6.13E-06 6.13E-06 6.13E-06 6.10E-06	0.00E+00 2.61E-04 1.23E-08 4.16E-06 0.00E+00 0.00E+00 1.21E-05 1.24E-05 0.00E+00 3.76E-08 0.00E+00 2.32E-03 3.84E-07 0.00E+00 2.32E-03 1.30E-02 6.17E-04 1.20E-04 7.24E-04 4.65E-05 9.35E-04 2.18E-04 2.59E-05 8.31E-04 6.36E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.49E-04 1.23E-08 3.32E-05 0.00E+00 6.23E-06 1.11E-05 0.00E+00 5.35E-03 0.00E+00 3.76E-08 0.00E+00 1.71E-03 6.41E-05 1.30E-02 6.13E-04 1.20E-04 4.86E-05 9.58E-04 3.85E-03 2.30E-02 1.51E-05 2.77E-06 1.70E-02 7.81E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 1.10E-03 6.06E-08 1.88E-05 0.00E+00 0.00E+00 2.24E-04 1.02E-04 0.00E+00 5.77E-03 0.00E+00 6.38E-06 0.00E+00 6.38E-06 0.00E+01 3.76E-08 0.00E+02 6.53E-04 1.30E-02 6.53E-04 1.30E-02 6.53E-04 1.31E-04 3.45E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-03 1.06E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 8.93E-04 8.93E-04 8.86E-06 0.00E+00 0.00E+00 1.99E-04 8.07E-05 0.00E+00 6.45E-03 0.00E+00 6.41E-06 0.00E+00 5.14E-03 9.80E-05 1.31E-02 6.40E-04 1.97E-04 3.18E-03 4.45E-04 1.97E-04 3.18E-03 1.74E-04 1.63E-03 1.77E-04 1.63E-03 1.77E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.63E-03 1.78E-04 1.02E-05 2.59E-03 1.59E-03 1.59E-03 1.59E-03 1.59E-03 1.69E-05 8.78E-06 1.61E-03 2.80E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 2.72E-03 1.41E-05 2.96E-04 0.00E+00 9.79E-04 1.36E-03 0.00E+00 2.59E-02 0.00E+00 1.37E-04 0.00E+00 1.37E-03 8.50E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-02 1.22E-03 3.22E-03 3.22E-03 3.22E-03 1.77E-02 9.11E-03 6.18E-03 1.57E-03 2.33E-04 1.10E-02 3.91E-01 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00

Table A-1. Ingestion dose conversion factors based on ICRP-72.

Nuclide	Adrenals	B Surface	Brain	Breast	S Wall	SI Wall	ULI Wall	LLI Wall	Kidneys	Liver	ET Region	Lung
Te-133	7.67E-06	3.47E-06	1.87E-06	2.90E-06	9.00E-04	1.49E-04	3.80E-05	1.55E-05	7.78E-06	5.13E-06	2.10E-06	4.09E-06
Te-133m	5.91E-05	3.01E-05	1.07E-05	2.04E-05	2.49E-03	1.36E-03	1.06E-03	4.17E-04	7.44E-05	4.91E-05	1.27E-05	2.84E-05
I-133 Xe-133	1.59E-04 0.00E+00	1.81E-04 0.00E+00	1.78E-04 0.00E+00	1.34E-04 0.00E+00	2.06E-03 0.00E+00	2.12E-04 0.00E+00	3.55E-04 0.00E+00	4.83E-04 0.00E+00	1.53E-04 0.00E+00	1.49E-04 0.00E+00	1.89E-04 0.00E+00	1.68E-04 0.00E+00
Xe-133m	0.00E+00											
Te-134	6.50E-05	4.25E-05	2.64E-05	3.20E-05	1.66E-03	4.64E-04	5.79E-04	1.69E-04	6.84E-05	5.44E-05	3.09E-05	4.08E-05
I-134 Cs-134	7.08E-05 7.73E-02	3.92E-05 7.39E-02	2.63E-05 5.71E-02	3.41E-05 5.22E-02	2.04E-03 6.99E-02	1.03E-04 7.71E-02	9.50E-05 7.49E-02	5.44E-05 8.34E-02	6.52E-05 7.24E-02	5.11E-05 7.31E-02	3.10E-05 6.86E-02	4.39E-05 6.51E-02
Cs-134m	2.60E-05	2.72E-05	2.20E-05	2.09E-05	4.27E-04	3.57E-05	4.06E-05	3.31E-05	2.51E-05	2.51E-05	2.40E-05	2.37E-05
I-135	1.65E-04	1.52E-04	1.29E-04	1.14E-04	2.01E-03	2.15E-04	2.81E-04	2.63E-04	1.58E-04	1.45E-04	1.45E-04	1.43E-04
Xe-135 Xe-135m	0.00E+00 0.00E+00											
Cs-135	7.12E-03	7.12E-03	7.12E-03	7.12E-03	7.40E-03	7.12E-03	8.03E-03	9.78E-03	7.12E-03	7.12E-03	7.12E-03	7.12E-03
Cs-136 Xe-137	1.22E-02 0.00E+00	1.20E-02 0.00E+00	8.69E-03 0.00E+00	7.92E-03 0.00E+00	1.20E-02 0.00E+00	1.23E-02 0.00E+00	1.20E-02 0.00E+00	1.36E-02 0.00E+00	1.13E-02 0.00E+00	1.14E-02 0.00E+00	1.06E-02 0.00E+00	1.01E-02 0.00E+00
Cs-137	5.19E-02	5.09E-02	4.36E-02	4.15E-02	4.96E-02	5.19E-02	5.34E-02	6.19E-02	4.99E-02	5.02E-02	4.84E-02	4.69E-02
Ba-137m	0.00E+00											
Xe-138 Cs-138	0.00E+00 4.52E-05	0.00E+00 2.56E-05	0.00E+00 1.83E-05	0.00E+00 2.46E-05	0.00E+00 2.60E-03	0.00E+00 9.61E-05	0.00E+00 6.60E-05	0.00E+00 3.29E-05	0.00E+00 4.31E-05	0.00E+00 3.38E-05	0.00E+00 2.07E-05	0.00E+00 2.96E-05
Cs-139	0.00E+00											
Ba-139	2.62E-06	1.09E-05	1.39E-06	1.60E-06	2.56E-03	1.96E-03	1.66E-03	3.74E-04	3.29E-06	2.54E-06	1.41E-06	1.80E-06
Cs-140 Ba-140	0.00E+00 7.70E-04	0.00E+00 6.06E-03	0.00E+00 3.71E-04	0.00E+00 2.78E-04	0.00E+00 2.32E-03	0.00E+00 6.15E-03	0.00E+00 3.15E-02	0.00E+00 1.06E-01	0.00E+00 8.37E-04	0.00E+00 5.53E-04	0.00E+00 3.22E-04	0.00E+00 3.99E-04
La-140	3.91E-04	4.27E-04	4.59E-06	9.27E-05	4.04E-03	1.02E-02	3.42E-02	6.45E-02	8.33E-04	5.92E-04	1.91E-05	1.31E-04
Ba-141	8.45E-06	1.01E-05	6.90E-07	2.51E-06	1.46E-03	6.48E-04	8.08E-04	4.32E-04	9.27E-06	5.66E-06	8.45E-07	3.63E-06
La-141 Ce-141	2.37E-06 2.00E-05	2.13E-06 1.83E-04	5.70E-08 9.21E-07	6.09E-07 2.81E-06	3.46E-03 8.25E-04	5.07E-03 2.15E-03	9.20E-03 1.13E-02	5.28E-03 3.20E-02	4.31E-06 4.50E-05	3.72E-06 8.82E-05	1.29E-07 1.07E-06	8.63E-07 5.23E-06
Ba-142	1.38E-05	7.01E-06	6.03E-07	3.91E-06	7.50E-04	3.66E-04	3.40E-04	9.20E-05	1.82E-05	1.16E-05	9.91E-07	5.57E-06
La-142 La-143	7.07E-05 9.30E-07	3.24E-05 7.38E-07	9.83E-07 8.93E-09	1.97E-05 2.29E-07	3.14E-03 1.46E-03	2.65E-03 3.20E-04	2.58E-03 2.01E-04	6.99E-04 3.14E-04	1.08E-04 1.39E-06	7.00E-05 9.76E-07	3.23E-06 3.21E-08	2.71E-05 3.42E-07
Ce-143	4.54E-05	8.11E-05	3.36E-07	7.80E-06	2.07E-03	4.94E-03	2.16E-02	4.31E-04	1.04E-04	8.07E-05	1.23E-06	1.26E-05
Pr-143	4.10E-08	6.39E-06	4.10E-08	4.10E-08	1.34E-03	3.32E-03	1.95E-02	5.46E-02	1.05E-05	5.08E-05	4.10E-08	4.10E-08
Ce-144 Pr-144	5.96E-05 2.41E-07	1.23E-03 6.70E-08	4.26E-05 2.87E-09	4.50E-05 6.96E-08	4.13E-03 1.52E-03	1.38E-02 3.56E-04	8.42E-02 6.59E-05	2.46E-01 3.51E-06	7.29E-05 2.66E-07	3.55E-03 1.58E-07	4.29E-05 9.65E-09	4.81E-05 1.00E-07
Pr-144m	0.00E+00	0.70E-08 0.00E+00	0.00E+00	0.90E+00	0.00E+00							
Ce-145	0.00E+00											
Pr-145 Ce-146	9.90E-07 0.00E+00	8.55E-07 0.00E+00	3.40E-08 0.00E+00	2.36E-07 0.00E+00	2.60E-03 0.00E+00	4.43E-03 0.00E+00	1.05E-02 0.00E+00	8.18E-03 0.00E+00	2.18E-06 0.00E+00	1.98E-06 0.00E+00	5.88E-08 0.00E+00	3.43E-07 0.00E+00
Pr-146	0.00E+00											
Ce-147	0.00E+00											
Pr-147 Nd-147	6.18E-06 3.06E-05	1.86E-06 1.22E-04	3.79E-08 2.60E-07	1.49E-06 4.94E-06	9.35E-04 1.32E-03	1.76E-04 3.42E-03	5.35E-05 1.76E-02	4.74E-05 4.75E-02	6.44E-06 7.27E-05	3.77E-06 8.21E-05	1.58E-07 8.00E-07	2.41E-06 8.38E-06
Pm-147	1.11E-08	1.61E-03	8.60E-09	8.69E-09	2.64E-04	6.61E-04	4.00E-03	1.17E-02	1.19E-08	4.30E-04	8.54E-09	9.39E-09
Pr-148	0.00E+00											
Pm-148 Pm-148m	1.21E-04 5.12E-04	1.57E-04 8.27E-04	1.44E-06 9.76E-06	2.81E-05 1.03E-04	3.61E-03 2.92E-03	9.13E-03 8.73E-03	4.51E-02 2.16E-02	1.15E-01 5.10E-02	2.63E-04 1.10E-03	2.17E-04 9.12E-04	5.75E-06 2.19E-05	4.01E-05 1.60E-04
Nuclide Te-133	4.59E-06	8.27E-06	Pancreas 2.52E-05	4.52E-06	2.53E-06	1.63E-05	1.94E-06	3.11E-06	3.01E-03	7.61E-06	4.26E-05	2.68E-04
Te-133m	4.18E-05	1.55E-04	1.73E-04	4.95E-05	2.08E-05	1.13E-04	1.76E-05	2.02E-05	1.19E-02	1.23E-04	2.08E-04	1.05E-03
I-133	1.85E-04	1.81E-04	2.10E-04	1.74E-04	1.37E-04	1.79E-04	1.47E-04	1.94E-04	3.04E-01	2.12E-04	4.11E-03	1.58E-02
Xe-133 Xe-133m	0.00E+00 0.00E+00											
Te-134	4.70E-05	9.99E-05	1.52E-04	4.99E-05	3.01E-05	1.05E-04	3.45E-05	3.61E-05	1.94E-03	8.77E-05	3.13E-04	4.00E-04
I-134	4.39E-05	5.11E-05	1.83E-04	4.27E-05	2.95E-05	1.23E-04	3.24E-05	3.78E-05	1.99E-03	5.52E-05	3.05E-04	3.98E-04
Cs-134 Cs-134m	6.41E-02 2.33E-05	7.97E-02 2.62E-05	8.05E-02 2.98E-05	6.91E-02 2.38E-05	4.80E-02 2.00E-05	7.24E-02 2.66E-05	6.43E-02 2.30E-05	6.90E-02 2.40E-05	6.86E-02 2.40E-05	8.09E-02 2.63E-05	7.49E-02 2.68E-05	7.12E-02 7.44E-05
I-135	1.56E-04	1.83E-04	2.71E-04	1.48E-04	1.11E-04	2.09E-04	1.40E-04	1.57E-04	5.92E-02	2.23E-04	2.42E-03	3.46E-03
Xe-135 Xe-135m	0.00E+00 0.00E+00											
Cs-135	7.12E-03	8.07E-03	7.40E-03									
Cs-136	9.93E-03	1.27E-02	1.28E-02	1.06E-02	7.16E-03	1.14E-02	9.93E-03	1.07E-02	1.06E-02	1.28E-02	1.19E-02	1.14E-02
Xe-137 Cs-137	0.00E+00 4.64E-02	0.00E+00 5.30E-02	0.00E+00 5.33E-02	0.00E+00 4.85E-02	0.00E+00 3.97E-02	0.00E+00 5.00E-02	0.00E+00 4.65E-02	0.00E+00 4.85E-02	0.00E+00 4.84E-02	0.00E+00 5.35E-02	0.00E+00 5.35E-02	0.00E+00 5.02E-02
Ba-137m	0.00E+00											
Xe-138	0.00E+00											
Cs-138 Cs-139	2.88E-05 0.00E+00	3.09E-05 0.00E+00	1.18E-04 0.00E+00	2.79E-05 0.00E+00	2.13E-05 0.00E+00	8.02E-05 0.00E+00	2.04E-05 0.00E+00	2.54E-05 0.00E+00	2.07E-05 0.00E+00	3.00E-05 0.00E+00	2.41E-05 0.00E+00	3.40E-04 0.00E+00
Ba-139	2.29E-06	6.46E-06	5.77E-06	1.09E-05	1.66E-06	4.18E-06	1.57E-06	1.54E-06	1.41E-06	5.29E-06	1.53E-05	4.46E-04
Cs-140	0.00E+00											
Ba-140 La-140	7.49E-04 6.43E-04	4.19E-03 5.15E-03	7.11E-04 7.71E-04	4.62E-03 9.70E-04	3.97E-04 2.57E-04	5.86E-04 5.89E-04	6.10E-04 4.81E-04	3.26E-04 6.90E-05	3.22E-04 1.91E-05	1.85E-03 2.39E-03	1.66E-03 1.56E-03	9.61E-03 7.49E-03
Ba-141	4.45E-06	1.24E-05	3.01E-05	1.07E-05	2.15E-06	1.91E-05	1.30E-06	2.03E-06	8.45E-07	1.03E-05	8.64E-06	2.59E-04
La-141 Ce-141	2.48E-06 4.03E-05	1.64E-05 3.75E-04	5.81E-06 4.23E-05	3.51E-06 7.14E-05	1.03E-06 1.18E-05	3.94E-06 3.28E-05	1.16E-06 2.93E-05	4.54E-07 2.34E-06	1.29E-07 1.07E-06	1.00E-05 1.68E-04	4.33E-06 1.20E-04	1.32E-03 2.63E-03
Ba-142	9.05E-06	3.92E-05	4.23E-05	1.24E-05	4.03E-06	2.81E-05	2.94E-06	3.10E-06	9.91E-07	2.95E-05	1.27E-05	1.31E-04
La-142	5.45E-05	2.84E-04	2.11E-04	7.02E-05	2.33E-05	1.38E-04	1.82E-05	1.48E-05	3.23E-06	2.11E-04	7.31E-05	6.73E-04
La-143 Ce-143	8.87E-07 8.30E-05	6.11E-06 7.46E-04	3.01E-06 1.03E-04	1.22E-06 1.28E-04	3.18E-07 2.65E-05	1.96E-06 7.43E-05	4.64E-07 5.67E-05	1.75E-07 5.73E-06	3.21E-08 1.23E-06	3.03E-06 3.34E-04	1.72E-06 2.10E-04	2.07E-04 4.14E-03
Pr-143	4.10E-08	4.10E-08	4.10E-08	6.39E-06	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	2.20E-07	4.33E-03
Ce-144	6.82E-05	2.78E-04	7.07E-05	7.14E-04	5.07E-05	6.23E-05	6.12E-05	4.46E-05	4.29E-05	1.40E-04	1.12E-04	1.94E-02
Pr-144 Pr-144m	1.20E-07 0.00E+00	3.30E-07 0.00E+00	9.11E-07 0.00E+00	1.26E-07 0.00E+00	5.28E-08 0.00E+00	5.72E-07 0.00E+00	2.35E-08 0.00E+00	5.39E-08 0.00E+00	9.65E-09 0.00E+00	2.80E-07 0.00E+00	9.25E-08 0.00E+00	1.87E-04 0.00E+00
Ce-145	0.00E+00											
Pr-145	1.14E-06	8.06E-06	2.40E-06	1.72E-06	4.43E-07	1.60E-06	5.61E-07	1.76E-07	5.88E-08	4.64E-06	2.14E-06	1.46E-03
Ce-146 Pr-146	0.00E+00 0.00E+00											
Ce-147	0.00E+00											
Pr-147	2.89E-06	7.69E-06	2.46E-05	2.93E-06	1.15E-06	1.52E-05	4.49E-07	1.09E-06	1.58E-07	6.27E-06	2.00E-06	1.21E-04
Nd-147 Pm-147	6.72E-05 1.12E-08	6.56E-04 3.36E-08	6.79E-05 1.21E-08	1.13E-04 1.29E-04	2.04E-05 9.15E-09	5.15E-05 1.05E-08	5.14E-05 1.01E-08	3.63E-06 8.70E-09	8.00E-07 8.54E-09	2.69E-04 1.90E-08	1.87E-04 9.66E-08	3.98E-03 9.67E-04
Pr-148	0.00E+00											
Pm-148 Pm-148m	2.19E-04 9.37E-04	1.83E-03 8.07E-03	2.37E-04 9.78E-04	3.50E-04 1.55E-03	8.55E-05 3.39E-04	1.84E-04 7.53E-04	1.79E-04 8.11E-04	2.10E-05 7.93E-05	5.75E-06 2.19E-05	8.14E-04 3.59E-03	5.64E-04 2.51E-03	9.92E-03 6.53E-03
40111	5.5. L 04	5.5. L 00	5 JL 04		5.55E 07		JL 04		2	3.55E 65	2.0.2 00	0.002 00

Table A-1. Ingestion dose conversion factors based on ICRP-72.

Nuolido	Adropolo	P Surface	Proin	Propet	S Wall	SI Wall	ULI Wall	LLI Wall	Kidnovo	Liver	ET Region	Lung
Nuclide Pm-149	2.09E-06	5.07E-06	4.91E-08	3.71E-07	S Wall 1.55E-03	3.69E-03	1.89E-02	4.23E-02	4.73E-06	9.42E-06	8.64E-08	Lung 5.81E-07
Pm-151	5.12E-05	8.00E-05	2.20E-07	8.53E-06	1.55E-03	3.64E-03	1.45E-02	2.60E-02	1.15E-04	8.08E-05	1.19E-06	1.39E-05
Sm-151	9.15E-09	2.13E-03	4.02E-09	3.19E-09	8.45E-05	2.11E-04	1.28E-03	3.76E-03	5.22E-09	5.68E-04	2.88E-09	7.11E-09
Eu-152	1.19E-03	4.26E-03	1.80E-04	2.64E-04	2.15E-03	5.79E-03	1.56E-02	3.74E-02	1.22E-03	5.86E-03	1.58E-04	5.20E-04
Sm-153	9.58E-06	4.83E-05	4.58E-08	8.87E-07	1.23E-03	2.96E-03	1.41E-02	3.02E-02	2.52E-05	2.22E-05	8.64E-08	2.11E-06
Eu-154	1.10E-03	8.61E-03	1.60E-04	2.48E-04	2.84E-03	7.56E-03	2.57E-02	6.67E-02	1.21E-03	7.15E-03	1.44E-04	4.74E-04
Eu-155	4.90E-05	2.46E-03	5.80E-06 4.95E-06	6.93E-06	3.69E-04	1.00E-03	4.58E-03	1.29E-02	6.29E-05 6.61E-04	7.81E-04	4.38E-06	2.05E-05
Eu-156 Tb-160	3.00E-04 2.88E-04	4.33E-04 8.44E-04	9.50E-06	7.26E-05 6.37E-05	3.08E-03 2.30E-03	8.39E-03 6.49E-03	3.26E-02 2.23E-02	8.44E-02 5.80E-02	6.19E-04	5.07E-04 5.59E-04	1.64E-05 1.67E-05	1.02E-04 9.49E-05
Ho-166m	3.30E-03	1.46E-02	4.64E-04	6.42E-04	3.93E-03	8.62E-03	1.92E-02	4.25E-02	2.79E-03	1.25E-02	4.04E-04	1.34E-03
Be-7	1.49E-05	2.21E-05	2.56E-06	3.26E-06	5.65E-05	1.78E-04	2.65E-04	4.74E-04	2.94E-05	1.91E-05	2.23E-06	5.26E-06
Na-24	1.28E-03	2.01E-03	9.26E-04	8.26E-04	4.41E-03	1.29E-03	1.45E-03	1.56E-03	1.17E-03	1.10E-03	1.03E-03	9.97E-04
Mn-54	1.77E-03	2.62E-03	6.16E-04	5.55E-04	1.62E-03	3.61E-03	5.38E-03	9.04E-03	1.56E-03	3.89E-03	6.05E-04	9.30E-04
Fe-55	3.17E-04	2.21E-03	3.17E-04	3.17E-04	3.42E-04	3.74E-04	6.64E-04	1.33E-03	3.17E-04	2.71E-03	3.17E-04	3.17E-04
Fe-59	3.90E-03	3.96E-03	1.68E-03	1.83E-03	4.11E-03	7.12E-03	1.47E-02	3.09E-02	3.63E-03	1.12E-02	2.02E-03	2.54E-03
Co-57	2.89E-04	4.34E-04 8.06E-04	1.70E-04	1.50E-04	4.43E-04 1.65E-03	9.05E-04 3.91E-03	2.19E-03	5.20E-03	2.97E-04	6.13E-04	1.99E-04	2.18E-04
Co-58 Co-60	8.58E-04 9.15E-03	7.61E-03	3.80E-04 5.05E-03	4.01E-04 5.00E-03	9.51E-03	1.56E-02	7.27E-03 2.42E-02	1.48E-02 4.31E-02	1.05E-03 8.84E-03	1.48E-03 1.66E-02	4.81E-04 6.33E-03	5.49E-04 6.61E-03
Cu-64	6.24E-05	5.69E-05	1.42E-04	4.06E-05	6.44E-04	7.57E-04	2.29E-03	2.79E-03	7.26E-05	1.37E-04	4.38E-05	4.69E-05
Cu-67	2.58E-04	2.95E-04	1.03E-03	2.03E-04	9.66E-04	1.22E-03	4.87E-03	1.07E-02	2.62E-04	8.41E-04	2.24E-04	2.27E-04
W-181	3.74E-05	2.39E-04	1.49E-05	6.70E-06	1.25E-04	3.02E-04	9.78E-04	2.51E-03	2.76E-04	7.93E-05	9.66E-06	1.57E-05
W-185	1.02E-05	5.46E-04	1.02E-05	1.02E-05	5.51E-04	9.56E-04	6.90E-03	2.00E-02	1.47E-03	2.61E-04	1.02E-05	1.02E-05
W-187	9.73E-05	2.53E-04	2.79E-05	3.80E-05	1.68E-03	2.93E-03	1.21E-02	2.01E-02	3.21E-04	1.53E-04	3.14E-05	4.84E-05
W-188	6.09E-05	3.55E-03	4.06E-05	3.64E-05	6.21E-04	1.69E-03	2.55E-02	1.06E-01	9.70E-03	1.72E-03	3.80E-05	4.23E-05
Au-198 Au-199	1.46E-04 4.54E-05	1.75E-04 7.43E-05	6.38E-05 2.66E-05	7.37E-05 2.74E-05	1.82E-03 7.25E-04	4.12E-03 1.62E-03	1.76E-02 7.58E-03	3.96E-02 1.78E-02	2.37E-04 6.73E-05	1.80E-04 5.33E-05	7.01E-05 2.79E-05	8.75E-05 3.14E-05
Pb-203	1.52E-04	3.81E-04	4.82E-05	4.91E-05	5.64E-04	1.27E-03	3.47E-03	6.62E-03	5.52E-04	3.41E-04	5.42E-05	7.67E-05
Th-229	2.80E-01	8.35E+01	2.80E-01	2.79E-01	2.84E-01	2.92E-01	3.55E-01	5.17E-01	1.17E+00	4.04E+00	2.80E-01	2.80E-01
Th-230	5.03E-02	4.54E+01	5.03E-02	5.03E-02	5.44E-02	6.04E-02	1.12E-01	2.30E-01	6.85E-01	5.89E-01	5.03E-02	5.03E-02
Th-234	7.85E-06	1.75E-04	2.41E-06	3.27E-06	3.69E-03	9.44E-03	5.60E-02	1.60E-01	7.01E-05	2.93E-05	2.52E-06	3.86E-06
U-233	1.05E-01	3.10E+00	1.05E-01	1.05E-01	1.09E-01	1.15E-01	1.67E-01	2.85E-01	1.08E+00	4.10E-01	1.05E-01	1.05E-01
U-234	1.02E-01	2.91E+00	1.02E-01	1.02E-01	1.06E-01	1.12E-01	1.63E-01	2.82E-01	1.06E+00	3.98E-01	1.02E-01	1.02E-01
U-235	9.50E-02	2.74E+00	9.49E-02	9.47E-02	9.90E-02	1.05E-01	1.59E-01	2.88E-01	9.83E-01	3.69E-01	9.48E-02	9.48E-02
U-237 U-238	3.67E-05 9.08E-02	3.89E-04 2.63E+00	3.50E-06 9.08E-02	6.10E-06 9.08E-02	1.01E-03 9.44E-02	2.58E-03 9.97E-02	1.25E-02 1.46E-01	3.23E-02 2.56E-01	5.18E-04 9.40E-01	5.89E-05 3.54E-01	3.67E-06 9.08E-02	1.02E-05 9.08E-02
U-240	4.08E-05	1.64E-04	2.14E-06	9.59E-06	3.14E-03	7.38E-03	2.63E-02	3.50E-02	2.78E-04	7.55E-05	3.16E-06	1.37E-05
Np-237	2.66E-02	2.01E+01	2.65E-02	2.64E-02	3.09E-02	3.76E-02	9.34E-02	2.23E-01	7.17E-02	3.20E-01	2.65E-02	2.65E-02
Np-239	3.33E-05	9.50E-05	1.90E-07	4.04E-06	1.28E-03	3.15E-03	1.45E-02	3.22E-02	7.75E-05	5.07E-05	5.28E-07	7.69E-06
Np-240	3.10E-05	1.38E-05	1.81E-07	7.06E-06	1.71E-03	1.13E-03	8.51E-04	1.88E-04	4.28E-05	2.64E-05	7.99E-07	1.11E-05
Pu-238	4.77E-02	2.74E+01	4.77E-02	4.77E-02	5.25E-02	5.96E-02	1.19E-01	2.58E-01	1.18E-01	5.77E+00	4.77E-02	4.77E-02
Pu-239	5.37E-02	3.05E+01	5.37E-02	5.37E-02	5.81E-02	6.47E-02	1.21E-01	2.50E-01	1.25E-01	6.39E+00	5.37E-02	5.37E-02
Pu-240 Pu-241	5.37E-02 1.10E-03	3.05E+01 6.06E-01	5.37E-02 1.10E-03	5.37E-02 1.10E-03	5.81E-02 1.12E-03	6.48E-02 1.16E-03	1.21E-01 1.44E-03	2.51E-01 2.10E-03	1.25E-01 1.84E-03	6.39E+00 1.26E-01	5.37E-02 1.10E-03	5.37E-02 1.10E-03
Am-241	5.67E-02	3.34E+01	5.67E-02	5.67E-02	6.16E-02	6.91E-02	1.44E-03	2.75E-01	1.71E-01	2.05E+00	5.67E-02	5.67E-02
Cm-242	8.53E-04	6.87E-01	8.53E-04	8.53E-04	6.11E-03	1.40E-02	8.01E-02	2.32E-01	1.48E-02	1.91E-01	8.53E-04	8.53E-04
Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
Pm-149	3.70E-06	3.09E-05	4.37E-06	7.71E-06	1.25E-06	3.30E-06	2.80E-06	2.87E-07	8.64E-08	1.49E-05	1.01E-05	3.68E-03
Pm-149 Pm-151	3.70E-06 8.67E-05	3.09E-05 7.36E-04	4.37E-06 1.13E-04	7.71E-06 1.35E-04	1.25E-06 2.84E-05	3.30E-06 8.24E-05	2.80E-06 5.99E-05	2.87E-07 6.22E-06	8.64E-08 1.19E-06	1.49E-05 3.55E-04	1.01E-05 2.20E-04	3.68E-03 2.71E-03
Pm-149 Pm-151 Sm-151	3.70E-06 8.67E-05 6.79E-09	3.09E-05 7.36E-04 5.92E-08	4.37E-06 1.13E-04 6.07E-09	7.71E-06 1.35E-04 1.70E-04	1.25E-06 2.84E-05 3.61E-09	3.30E-06 8.24E-05 3.22E-09	2.80E-06 5.99E-05 2.91E-09	2.87E-07 6.22E-06 3.13E-09	8.64E-08 1.19E-06 2.88E-09	1.49E-05 3.55E-04 6.09E-09	1.01E-05 2.20E-04 8.49E-08	3.68E-03 2.71E-03 3.63E-04
Pm-149 Pm-151 Sm-151 Eu-152	3.70E-06 8.67E-05 6.79E-09 7.88E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03
Pm-149 Pm-151 Sm-151 Eu-152	3.70E-06 8.67E-05 6.79E-09 7.88E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 4.42E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 1.94E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 4.42E-03 7.98E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 1.94E-03 3.78E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 2.52E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 4.42E-03 7.98E-03 2.05E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 2.52E-05 1.02E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 4.42E-03 7.98E-03 2.05E-04 1.23E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05 1.47E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 1.94E-03 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 2.52E-05 1.02E-03 1.05E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 4.42E-03 7.98E-03 2.05E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 2.52E-05 1.02E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05 1.47E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00 2.23E-06	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 1.94E-03 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 2.59E-03 2.41E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.513E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 3.17E-04 6.49E-03 7.50E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 3.28E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 2.84E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 3.17E-04 1.72E-03 1.72E-03	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 2.60E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.52E-03 1.95E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 3.17E-04 2.59E-03 2.41E-04 8.64E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 3.17E-04 6.49E-03 7.50E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 3.28E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.9E-03 4.9E-03 4.9E-03 4.9E-03 1.8E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 3.17E-04 1.72E-03 1.52E-04 4.68E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 8.50E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.20E-03 2.19E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.55E-04 5.04E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 4.04E-04 0.00E+00 0.00E+00 0.223E-06 1.03E-03 6.05E-04 3.17E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 0.58E-05 1.56E-03 1.58E-03 3.17E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 6.62E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 1.05E-03 2.52E-05 2.52E-05 2.52E-05 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03 2.52E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 3.28E-04 1.08E-03 9.65E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 4.938E-06 7.89E-04 5.93E-04 4.75E-04 4.68E-04 4.75E-03	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 8.50E-04 7.73E-03	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.19E-03 4.88E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 6.62E-03 7.80E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 8.64E-04 8.64E-04 8.64E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.513E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 3.17E-04 6.49E-03 1.59E-02 1.77E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 3.28E-04 1.08E-03 3.28E-04 1.08E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.36E-05 1.47E-03 2.29E-03 4.19E-03 7.99E-03 7.99E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 5.93E-04 3.17E-04 1.72E-03 1.52E-04 4.68E-04 4.75E-03	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 2.60E-04 8.50E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 5.51E-05 6.46E-04 3.17E-04 5.04E-04 4.96E-03 4.96E-04 4.96E-04 4.96E-04 4.96E-04 4.96E-04 4.96E-04 5.9	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 6.62E-03 7.80E-04 2.77E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.05E-03 2.52E-05 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 9.65E-03 1.66E-04 8.88E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-03 7.99E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 5.93E-04 4.75E-03 4.68E-04 4.75E-03 4.68E-04 4.75E-03	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 6.59E-04 7.73E-03 6.59E-04 7.73E-03 6.59E-05 2.51E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.20E-03 2.19E-04 7.73E-03 5.15E-05 2.27E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.223E-06 1.03E-03 6.05E-04 4.81E-04 4.81E-04 6.33E-03	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 9.31E-05 1.21E-03 2.12E-03 4.89E-04 4.19E-03 4.88E-04 2.15E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 1.58E-03 3.17E-04 3.31E-03 4.28E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 2.59E-03 2.41E-04 8.64E-04 7.12E-03 5.91E-05 2.38E-04 3.29E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 4.26E-04 4.26E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 9.65E-03 1.56E-04 4.08E-03 9.65E-03	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.36E-05 1.47E-03 2.29E-03 4.19E-03 7.99E-03 7.99E-03	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 2.17E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 4.938E-06 7.89E-04 3.17E-04 1.72E-03 1.52E-04 4.68E-04 4.75E-03 4.30E-05 2.05E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 2.27E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 5.51E-05 6.46E-04 3.17E-04 5.04E-04 4.96E-03 4.96E-04 4.96E-04 4.96E-04 4.96E-04 4.96E-04 4.96E-04 5.9	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 2.77E-03 1.26E-02
Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.05E-03 2.52E-05 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 9.65E-03 1.66E-04 8.88E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-05 2.59E-04 8.58E-05	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 5.93E-04 4.75E-03 4.68E-04 4.75E-03 4.68E-04 4.75E-03	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 6.59E-04 7.73E-03 6.59E-04 7.73E-03 6.59E-05 2.51E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.20E-03 2.19E-04 7.73E-03 5.15E-05 2.27E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 4.81E-04 4.81E-04 4.83E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 6.58E-05 1.66E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 9.62E-03	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.26E-03 2.88E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-64 Vu-181 W-185 W-187 W-188	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 8.64E-04 7.12E-03 5.91E-05 2.38E-04 3.29E-05 1.02E-05 1.02E-05 5.45E-04 5.45E-05 5.45E-05 5.45E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.243E-04 2.43E-04 1.04E-05 8.26E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.28E-04 1.08E-03 3.28E-04 4.08E-03 3.28E-04 4.79E-05 1.02E-05 1.75E-04 6.24E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-03 4.30E-03 4.30E-03 4.30E-03 4.9E-03 2.29E-03 2.84E-04 1.15E-03 7.99E-05 2.59E-04 8.58E-05 1.87E-04 2.03E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 2.17E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 4.938E-06 7.89E-04 4.75E-03 4.75E-04 4.68E-04 4.75E-03 4.30E-05 2.05E-04 1.16E-05 1.02E-05 5.93E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 8.50E-04 4.50E-04 8.50E-04 1.27E-03 2.60E-04 8.50E-04 1.27E-03 2.68E-04 8.50E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-05 2.27E-04 1.89E-05 9.97E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.17E-04 3.17E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.83E-05 3.83E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 4.81E-04 4.81E-04 9.66E-06 1.02E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.25E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.62E-03 2.88E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-58 Co-60 Cu-64 Cu-67 W-185 W-185 W-187 W-188 Au-198	3.70E-06 6.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 1.02E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.04E-05 8.26E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.06E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 8.88E-04 4.79E-05 1.02E-05 1.75E-04 8.88E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 5.80E-03 2.29E-03 2.84E-04 1.15E-03 7.99E-03 7.99E-05 2.59E-04 4.58E-05 1.87E-04 2.03E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 3.17E-04 1.72E-03 1.52E-04 4.68E-04 4.75E-03 4.00E-05 5.93E-05 1.02E-05 5.93E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.26E-03 9.79E-04 9.36E-03 7.26E-03 7.26E-03 8.50E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 2.68E-04 8.36E-04 8.36E-04 8.36E-04 8.36E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-05 5.27E-04 1.89E-05 9.97E-05 4.88E-05 1.73E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.48E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 3.17E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 3.83E-05 7.78E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 0.00E+00 4.19E-03 3.17E-04 4.19E-03 4.88E-04 1.13E-02 1.14E-04 3.29E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 3.15E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.26E-02 4.50E-04 1.26E-03 2.88E-04 1.46E-03 2.88E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.02E-03 2.59E-03 2.41E-04 7.12E-03 5.91E-05 1.02E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.19E-03 3.12E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 9.65E-03 1.60E-03 1.60E-03 1.60E-03 1.60E-03 1.60E-04 1.08E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.03E-04 6.24E-05 2.30E-04 6.24E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.69E-03 2.61E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 2.84E-04 1.15E-03 7.99E-03 2.59E-04 8.58E-05 1.87E-04 8.58E-05	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 5.93E-04 4.75E-03 1.72E-03 1.52E-04 4.75E-03 4.30E-05 1.02E-05 5.93E-05 4.12E-05 1.02E-05 5.93E-05 4.12E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 2.68E-03 1.88E-04 8.36E-03	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.73E-04 4.88E-05 1.73E-04 4.88E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.63E-05 3.76E-05 2.90E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 3.17E-04 4.28E-04 1.73E-03 8.45E-05 3.25E-04 1.17E-04 3.39E-04 8.72E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 4.77E-03 1.26E-02 4.50E-04 1.64E-03 2.88E-04 1.64E-03 2.38E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-188 Au-198 Au-198 Au-199 Pb-203	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 8.64E-04 7.12E-03 5.91E-05 1.02E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 4.02E-03 7.50E-04 4.11E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.243E-04 2.43E-04 1.77E-04 1.19E-03 3.12E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.27E-04 1.68E-03 3.28E-04 4.08E-03 3.28E-04 4.79E-05 1.75E-04 6.24E-05 2.30E-04 6.71E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 2.84E-04 1.15E-03 7.99E-05 2.59E-04 8.58E-05 1.87E-04 2.03E-04 1.22E-03 2.82E-04 7.65E-05 2.52E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 2.17E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 4.938E-06 7.89E-04 4.5E-03 4.5E-03 4.5E-03 4.5E-04 1.7E-05 5.93E-05 5.93E-05 5.93E-05 5.93E-05 5.93E-05 5.93E-05 6.99E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 8.50E-04 4.50E-04 2.43E-04 1.27E-03 2.68E-04 8.50E-04 1.27E-03 1.28E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 9.97E-05 1.02E-05 9.97E-05 1.73E-04 4.98E-05 1.73E-04	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.83E-05 3.83E-05 3.86E-05 7.78E-05 6.01E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 4.81E-04 4.83E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 1.98E-03 1.60E-04 1.98E-03 3.78E-03 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-04 1.05E-04 9.64E-05 6.06E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.25E-04 1.17E-04 8.72E-04 8.72E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.64E-03 2.88E-04 1.64E-03 2.83E-03 7.72E-03 3.33E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.02E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.27E-04 3.29E-05 1.27E-04 3.29E-05 1.27E-04 5.46E-05 1.27E-05 1.46E-04 5.46E-05 1.46E-04 5.41E-05 1.46E-04 5.41E-05 1.46E-05 1.46E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.79E-04 1.79E-04 4.17E-04 4.26E-04 2.43E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.79E-03 3.12E-04 8.64E-04 7.04E-05	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.28E-04 4.98E-03 3.28E-04 4.99E-03 1.66E-04 8.88E-04 4.79E-05 1.75E-04 6.24E-05 2.30E-04 6.27E-05 2.07E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 2.29E-03 2.29E-03 5.80E-03 2.29E-03 7.99E-03 7.99E-04 8.58E-05 1.47E-04 2.59E-04 8.58E-05 1.59E-04 8.58E-05 2.59E-04 8.58E-05 2.59E-04 8.58E-05 2.59E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 3.17E-04 1.72E-03 4.50E-04 4.75E-03 4.30E-05 5.93E-04 1.16E-05 5.93E-05 4.12E-05 4.12E-05 6.59E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 6.89E-04 7.73E-03 6.89E-05 1.26E-04 8.36E-04 4.43E-04 1.27E-03 2.68E-04 5.68E-05 1.66E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 9.97E-06 1.89E-05 9.97E-06 4.88E-05 1.02E-05 9.97E-06 4.88E-05 1.10E-04 4.98E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.4E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 3.76E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.80E-05 7.01E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 0.00E+00 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 4.19E-03 4.9E-04 4.05E-04 1.05E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 4.56E-03 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 1.56E-03 7.15E-04 3.25E-04 1.17E-04 3.25E-04 1.21E-03 7.15E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.64E-03 2.88E-04 1.64E-03 3.88E-04 1.64E-03 3.83E-03 3.83E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-229 Th-230	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-06 1.02E-03 2.59E-03 2.41E-04 7.12E-03 5.91E-05 1.02E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.54E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.77E-04 1.7	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.31E-04 3.98E-03 1.60E-03 3.28E-04 1.08E-03 1.56E-04 4.79E-05 1.02E-05 1.02E-05 2.03E-04 6.71E-05 2.07E-04 2.80E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.69E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-03 7.99E-05 1.87E-04 8.58E-05 1.87E-04 4.30E-04 4.50E-03 2.59E-04 4.50E-05 2.59E-04 4.50E-05 2.59E-04 4.50E-05 2.59E-04 4.00E+00 1.56E-05 2.52E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 5.93E-04 4.72E-03 1.52E-04 4.75E-03 4.30E-05 1.02E-05 1.02E-05 5.93E-05 4.12E-05 1.02E-05 5.93E-05 4.12E-05 1.04E-04 3.44E-05 6.59E-05 2.79E-01 5.03E-04	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.56E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 1.02E-05 1.02E-05 1.73E-04 4.88E-05 1.73E-04 4.88E-05 1.73E-04 7.13E-01 7.13E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.90E-05 6.01E-05	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 0.223E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-05 3.44E-05 3.46E-06 1.02E-05 7.01E-05 5.29E-05	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.19E-03 1.13E-02 1.14E-04 2.20E-04 1.03E-04 1.03E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 1.56E-03 1.58E-03 3.17E-04 4.28E-04 1.73E-03 8.45E-05 3.25E-04 8.72E-04 1.21E-03 7.15E-04 2.55E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.64E-03 2.38E-04 1.64E-03 3.38E-04 1.64E-03 3.82E-03 3.82E-03 3.82E-03 3.82E-03 9.82E-03 9.83E-04 1.64E-03 9.83E-04 1.64E-03 9.83E-04 1.64E-03 9.83E-04 1.64E-03 9.83E-04 1.64E-03 9.83E-03 9.14E-04
Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.02E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.27E-04 3.29E-05 1.27E-04 3.29E-05 1.27E-04 5.46E-05 1.27E-05 1.46E-04 5.46E-05 1.46E-04 5.41E-05 1.46E-04 5.41E-05 1.46E-05 1.46E-04	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.79E-04 1.79E-04 4.17E-04 4.26E-04 2.43E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.79E-03 3.12E-04 8.64E-04 7.04E-05	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.28E-04 4.98E-03 3.28E-04 4.98E-03 1.66E-04 8.88E-04 4.79E-05 1.02E-05 1.75E-04 6.24E-05 2.30E-04 6.71E-04 2.80E-01 5.30E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 2.29E-03 2.29E-03 2.29E-03 2.29E-03 2.29E-03 5.80E-03 2.29E-03 7.99E-03 7.99E-05 2.59E-04 8.58E-05 1.87E-04 2.03E-04 7.65E-05 2.52E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 3.17E-04 1.72E-03 4.50E-04 4.75E-03 4.30E-05 5.93E-04 1.16E-05 5.93E-05 4.12E-05 4.12E-05 6.59E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 9.79E-04 9.36E-03 7.26E-03 7.26E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 2.68E-04 8.36E-03 1.88E-04 5.68E-05 1.56E-04 2.80E-01 5.03E-02 1.14E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 9.97E-06 1.89E-05 9.97E-06 4.88E-05 1.02E-05 9.97E-06 4.88E-05 1.10E-04 4.98E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.4E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 3.76E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.14E-05 5.42E-05 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 0.00E+00 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 4.19E-03 4.9E-04 4.05E-04 1.05E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 4.56E-03 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 1.56E-03 7.15E-04 3.25E-04 1.17E-04 3.25E-04 1.21E-03 7.15E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.26E-03 2.88E-04 1.26E-03 3.83E-03 7.72E-03 3.83E-03 9.14E-04 0.00E+00
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 1.02E-03 3.17E-04 2.59E-03 2.41E-04 7.12E-03 5.91E-05 1.02E-05 1.02E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-04 5.46E-05 1.27E-05 1.27E-04 1.27E-05 1.27E-04 1.27E-05 1.27E-	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.77E-04 1.9E-03 3.12E-04 1.77E-04 1.9E-03 3.12E-04 1.77E-04 1.9E-03 3.12E-04 1.06E-01 1.22E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.31E-04 3.98E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 4.79E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.03E-01 1.03E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-05 1.87E-04 8.58E-05 1.87E-04 4.00E+00 1.22E-03 2.52E-04 4.00E+00 1.08E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 4.72E-03 1.52E-04 4.75E-03 4.30E-05 5.93E-05 5.93E-05 6.59E-05 5.93E-05 6.59E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 9.79E-04 9.36E-03 9.79E-04 9.36E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.56E-01 1.56E-01 1.50E-01 1.50E-01 1.50E-01	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 4.98E-05 1.73E-04 7.13E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.73E-01 1.773E-01 1.773E-01 1.773E-01 1.773E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 6.36E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 5.03E-02 3.03E-06 1.05E-01	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04 6.33E-05 2.24E-05 3.80E-05 7.01E-05 3.80E-05 7.01E-05 5.42E-05 0.00E+00 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.77E-04 4.19E-03 3.17E-04 4.19E-03 4.19E-03 4.19E-03 4.20E-04 1.03E-05 4.20E-04 1.03E-05 4.20E-04 1.05E-04 1.05E-04 1.05E-04 0.00E+00 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 3.31FE-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.26E-04 8.72E-04 8.72E-04 1.71E-04 0.00E+00 0.00E+00 0.00E+00	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.64E-03 2.33E-03 3.82E-03 3.82E-03 1.64E-03 2.33E-03 9.14E-04 0.00E+00 0.00E+00
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-185 W-185 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-229 Th-230 Th-234 U-233 U-234	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.05E-03 3.17E-04 2.59E-03 3.17E-04 2.59E-03 3.17E-04 2.59E-03 5.91E-05 2.38E-04 3.29E-05 1.02E-05 1.27E-04 5.91E-05 1.27E-04 5.91E-05 1.27E-04 5.91E-05 1.27E-04 5.91E-05 1.27E-04 5.91E-05 1.27E-04 5.91E-05 1.46E-04 1.96E-	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.74E-04 1.74E-04 1.74E-04 1.74E-04 1.75E-04 1.79E-04 1.79E-04 1.79E-04 1.79E-04 1.96E-01 1.02E-01 1.02E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.17E-04 3.98E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 8.88E-04 4.79E-05 1.72E-05 1.72E-04 6.24E-05 2.30E-04 6.71E-05 1.05E-01 1.05E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.94E-04 1.15E-03 7.99E-05 2.59E-04 4.00E-04 1.22E-03 2.82E-04 7.65E-05 2.52E-04 4.00E+00 1.68E-04 3.11E-01 3.00E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 1.72E-03 1.52E-04 4.76E-03 1.52E-04 4.76E-03 1.52E-04 4.76E-05 1.02E-05 5.93E-04 3.17E-05 1.02E-05 5.93E-05 4.12E-05 1.02E-05 6.29E-05 6.29E-01 6.22E-06 1.05E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 7.26E-03 7.26E-03 7.26E-03 2.60E-04 8.50E-04 2.43E-04 1.27E-03 2.68E-04 2.43E-04 1.27E-03 2.68E-04 1.27E-03 2.68E-04 1.27E-03 2.68E-04 1.27E-03 2.68E-04 1.27E-03 1.88E-04 1.26E-01 1.02E-01 1.02E-01 1.02E-01	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 2.27E-04 4.89E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 4.98E-05 1.73E-04 4.98E-05 1.73E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.22E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.48E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 5.03E-01 1.02E-01 1.02E-01	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 4.04E-04 0.00E+00 0.00E+00 2.23E-06 1.03E-03 4.31F-04 2.02E-03 1.99E-04 4.81E-04 6.33E-03 4.38E-05 3.24E-04 9.66E-06 1.02E-05 3.14E-05 3.80E-05 5.42E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.78E-03 3.194E-05 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.19E-03 4.19E-03 4.19E-04 4.19E-04 4.05E-04 1.05E-04 1.05E-04 1.06E-04 1.06E-04 1.09E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 3.31E-03 3.17E-04 3.31E-03 8.45E-05 1.56E-03 1.7E-04 3.31E-03 8.45E-05 1.7E-04 1.73E-03 8.7E-04 1.73E-04 1.21E-03 7.15E-04 2.55E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.26E-02 4.50E-04 1.26E-02 4.50E-04 1.26E-03 2.88E-04 1.64E-03 3.83E-03 6.62E-03 1.26E-02 4.50E-04 1.64E-03 2.33E-03 7.72E-03 3.82E-03 1.63E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-235 U-237	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.05E-03 2.52E-05 1.02E-03 2.41E-04 2.59E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01 1.02E-01	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.77E-04 4.64E-01 1.22E-04 1.2	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 4.99E-03 1.56E-04 4.99E-05 1.02E-06 1.75E-04 6.24E-05 2.30E-04 6.71E-05 2.07E-04 1.08E-01 1.08E-01 1.08E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 7.99E-03 7.99E-03 7.99E-04 8.58E-05 1.87E-04 2.03E-04 1.22E-03 2.82E-04 1.22E-03 2.82E-04 1.25E-04 1.25E-04 1.25E-04 1.26E-05 1.87E-04 1.26E-05 1.87E-04 1.26E-05 1.87E-04 1.26E-05 1.87E-04 1.26E-03 1.86E-05 1.87E-04 1.26E-03 1.86E-05 1.87E-04 1.26E-03 1.86E-05 1.87E-04 1.26E-03 1.86E-04 1.26E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 5.93E-04 5.93E-04 1.72E-03 4.30E-05 1.02E-05 5.93E-05 4.12E-05 5.93E-05 4.12E-05 5.93E-01 5.03E-02 6.25E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 2.68E-04 8.50E-04 1.27E-03 2.68E-04 8.50E-04 1.27E-03 2.68E-04 8.50E-01 1.26E-01 1.26E-01 1.26E-01 1.26E-01	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.10E-04 4.98E-05 1.10E-04 1.71E-05 1.02E-01 1.71E-05 1.02E-01 1.72E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.99E-05 6.01E-05 2.90E-05 6.01E-05 2.90E-05 6.01E-05 2.90E-05 6.01E-05 2.90E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.03E-01 5.05E-01	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.14E-05 5.42E-05 0.00E+00 0.0	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 0.00E+00 4.19E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04 0.00E+00	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 1.58E-03 3.17E-04 3.31E-03 4.28E-04 1.77E-04 3.39E-04 8.72E-04 1.71E-04 3.39E-04 0.00E+00 0.0	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 1.26E-03 2.88E-04 1.26E-03 3.82E-03 7.72E-03 3.82E-03 7.72E-03 3.82E-03 7.72E-03 9.14E-04 0.00E+00
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-235 U-237	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.02E-03 2.41E-04 7.12E-03 5.91E-05 1.02E-05 1.02E-05 1.27E-04 5.46E-05 1.27E-04 5.91E-05 1.47E-04 2.80E-01 1.03E-01 1.03E-01 1.03E-01	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.54E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.77E-04 1.9E-03 3.12E-04 1.77E-04 1.9E-03 3.12E-04 1.06E-01 1.22E-04 9.66E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.02E-01 9.66E-02	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 4.79E-05 1.02E-05 1.02E-05 2.30E-04 2.30E-04 2.50E-01 1.75E-04 6.24E-05 2.30E-04 2.80E-01 5.03E-01 9.03E-01 9.03E-01 9.03E-01 9.03E-01 9.03E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.84E-04 1.15E-03 7.99E-03 7.99E-05 8.58E-05 1.87E-04 4.00E+00 1.08E-04 4.11E-01 3.00E-01 2.81E-01 1.37E-04 2.76E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.93E-04 4.75E-03 1.52E-04 4.75E-03 4.30E-05 1.02E-05 5.93E-05 5.93E-05 5.93E-05 6.59E-06 1.04E-04 1.72E-03 1.52E-04 1.72E-03 1.52E-04 1.72E-03 1.52E-04 1.72E-03 1.52E-04 1.72E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 2.79E-01 1.02E-01 9.47E-02 2.05E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 9.79E-04 9.36E-03 9.79E-04 8.50E-04 8.50E-04 1.27E-03 6.89E-05 1.26E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.56E-04	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 7.13E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.02E-01 9.48E-02 4.75E-05 9.08E-02	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 6.36E-06 1.02E-05 3.76E-06 7.78E-05 2.90E-05 6.01E-05 2.90E-05 6.01E-05 2.90E-01 1.02E-01 9.48E-02 5.56E-06 9.08E-02	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04 6.33E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 2.79E-05 5.42E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.80E-01 5.03E-02 2.52E-06	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 3.78E-03 0.00E+00 0.00E+00 9.31E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-04 1.05E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 5.03E-02 5.01E-05	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.26E-04 4.72E-04 8.72E-04 0.00E+00 0.0	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.26E-03 1.26E-02 4.50E-04 1.64E-03 2.33E-03 3.82E-03 1.68E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.85E+00
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-185 W-187 W-188 Au-198 Au-198 Au-198 Au-198 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 1.02E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-05 1.48E-06 1.02E-01 5.03E-02 6.72E-05 9.08E-02 6.72E-05 9.08E-02 6.72E-05 9.08E-02 6.72E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 4.02E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.77E-04 1.92E-03 3.12E-04 1.04E-05 8.26E-04 1.77E-04 1.19E-03 3.12E-04 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 9.65E-03 8.88E-04 4.79E-05 1.75E-04 6.24E-05 2.30E-05 1.75E-04 6.24E-05 2.30E-01 5.03E-02 1.02E-01 1.02E-01 1.02E-01 1.02E-01 9.49E-02 7.38E-05 9.49E-02 7.38E-05 9.49E-02 8.88E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 2.29E-03 2.29E-03 2.59E-05 1.47E-03 2.29E-03 5.80E-03 2.99E-05 2.59E-04 4.50E-03 2.99E-05 2.59E-04 4.22E-03 2.25E-04 4.00E+00 1.56E+00 1.08E-04 3.11E-01 1.37E-04 2.76E-01 1.37E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 4.76E-03 6.59E-04 1.16E-05 6.59E-05 6.59E-05 6.59E-06 6.279E-01 5.03E-02 6.25E-06 1.02E-01 9.47E-02 2.05E-05 9.08E-02 2.21E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 8.50E-04 4.50E-03 9.76E-03 2.60E-04 8.50E-04 7.73E-03 2.60E-04 8.50E-04 7.73E-03 2.60E-04 8.50E-04 7.73E-03 1.60E-04 1.27E-03 1.68E-04 1.26E-04 1.06E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.04E-02 5.80E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-05 5.27E-04 1.89E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 4.98E-05 1.10E-04 7.13E-01 1.71E-05 1.06E-01 1.22E-01 9.48E-02 4.75E-05 9.08E-02 4.75E-05 9.08E-02 4.75E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.83E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 5.03E-02 5.66E-06 1.05E-01 1.02E-01 9.48E-02 5.56E-06 9.08E-02 7.52E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 4.04E-04 0.00E+00 0.00E+00 0.223E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.80E-05 5.42E-05 0.00E+00 0.	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.78E-03 3.17E-04 4.19E-03 4.88E-04 1.13E-02 1.14E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 1.58E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.25E-04 1.73E-04 3.25E-04 1.25E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E-01 5.03E-02	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 6.00E+00 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.26E-02 4.50E-04 1.64E-03 2.88E-04 1.64E-03 2.88E-04 1.64E-03 3.82E-03 7.72E-03 3.82E-03 7.72E-03 3.82E-03 1.63E-03 7.72E-03 1.63E-03 7.72E-03 1.63E-03
Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238 U-240 Np-237	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.05E-03 2.52E-05 1.02E-03 2.4TE-04 2.59E-03 2.4TE-04 2.59E-03 2.4TE-04 3.29E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.99E-04 5.46E-05 1.99E-04 5.49E-01 1.02E-01	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.54E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.04E-05 8.26E-04 1.79E-03 3.12E-04 8.64E-04 1.06E-01 1.22E-04 8.64E-04 1.06E-01 1.22E-04 8.64E-04 1.06E-01 1.22E-04 8.68E-01 9.08E-02 4.58E-04 9.08E-02 4.58E-04 9.08E-02 4.58E-04 9.08E-02 4.58E-04 9.08E-02 4.58E-04	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.98E-03 3.28E-04 4.79E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01 2.30E-04 6.24E-05 2.30E-01 1.02E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 7.99E-03 7.99E-03 8.80E-03 2.84E-04 1.15E-03 7.99E-03 2.59E-04 8.58E-05 1.87E-04 1.22E-03 2.82E-04 7.65E-05 2.52E-04 1.00E-01 1.56E+00 1.56E+00 1.56E+00 1.56E+00 1.50E-01 1.50E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.38E-06 7.89E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.38E-04 5.98E-05 1.02E-05 5.93E-05 1.04E-05 2.79E-01 1.02E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 2.60E-04 7.73E-03 2.69E-05 2.51E-04 2.43E-04 1.27E-03 1.88E-04 5.68E-05 1.56E-04 2.80E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 9.49E-02 5.80E-05 9.08E-02 6.06E-05 5.60E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.19E-05 9.59E-04 7.42E-04 2.19E-05 9.59E-04 7.3E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 4.98E-05 1.10E-04 7.13E-01 1.71E-05 1.02E-01 9.48E-05 1.06E-01 1.71E-05 9.08E-02 3.84E-05 9.08E-02 3.84E-05 9.08E-02	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 9.48E-02 7.52E-06 9.08E-02 7.52E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 4.317E-04 4.81E-04 6.33E-05 7.01E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.03E-01	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 0.00E+00 0.00E+00 9.31E-05 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-04 1.05E-04 1.05E-04 0.00E+00 1.503E-02 5.01E-05 1.55E-01	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 1.58E-03 3.17E-04 1.73E-03 8.45E-05 3.25E-04 1.77E-04 3.39E-04 1.71E-04 3.39E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.50E-01 1.50E-01	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 1.26E-03 2.88E-04 1.26E-03 2.33E-03 7.72E-03 3.82E-03 3.82E-03 9.14E-04 0.00E+00 0.00E+01 1.26E-02
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-185 W-187 W-188 Au-198 Au-198 Au-198 Au-198 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 5.18E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 1.02E-03 2.41E-04 2.59E-03 2.41E-04 3.29E-05 1.02E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.22E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-04 5.91E-05 1.48E-05 1.48E-06 1.02E-01 5.03E-02 6.72E-05 9.08E-02 6.72E-05 9.08E-02 6.72E-05 9.08E-02 6.72E-05	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 4.02E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.77E-04 1.92E-03 3.12E-04 1.04E-05 8.26E-04 1.77E-04 1.19E-03 3.12E-04 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.28E-04 1.08E-03 9.65E-03 8.88E-04 4.79E-05 1.75E-04 6.24E-05 2.30E-05 1.75E-04 6.24E-05 2.30E-01 5.03E-02 1.02E-01 1.02E-01 1.02E-01 1.02E-01 9.49E-02 7.38E-05 9.49E-02 7.38E-05 9.49E-02 8.88E-04	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 2.29E-03 2.29E-03 2.59E-05 1.47E-03 2.29E-03 5.80E-03 2.99E-05 2.59E-04 4.50E-03 2.99E-05 2.59E-04 4.22E-03 2.25E-04 4.00E+00 1.56E+00 1.08E-04 3.11E-01 1.37E-04 2.76E-01 1.37E-04	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 5.79E-04 4.76E-03 6.59E-04 1.16E-05 6.59E-05 6.59E-05 6.59E-06 6.279E-01 5.03E-02 6.25E-06 1.02E-01 9.47E-02 2.05E-05 9.08E-02 2.21E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 8.50E-04 4.50E-03 9.76E-03 2.60E-04 8.50E-04 7.73E-03 2.60E-04 8.50E-04 7.73E-03 2.60E-04 8.50E-04 7.73E-03 1.60E-04 1.27E-03 1.68E-04 1.26E-04 1.06E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.04E-02 5.80E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-05 5.27E-04 1.89E-05 1.02E-05 9.97E-05 1.02E-05 9.97E-05 1.10E-04 7.13E-01 1.71E-05 1.06E-01 1.72E-05 9.97E-05 1.06E-01 9.75E-05 9.97E-05 9.98E-05 9.97E-05 9.98E-05 9.98E-05 9.98E-05 9.98E-05 9.98E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.83E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 5.03E-02 5.66E-06 1.05E-01 1.02E-01 9.48E-02 5.56E-06 9.08E-02 7.52E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 4.04E-04 0.00E+00 0.00E+00 0.223E-06 1.03E-03 6.05E-04 3.17E-04 2.02E-03 1.99E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.80E-05 5.42E-05 0.00E+00 0.	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.78E-03 3.17E-04 4.19E-03 4.88E-04 1.13E-02 1.14E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 1.58E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 8.45E-05 3.25E-04 1.73E-04 3.25E-04 1.25E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E+01 0.00E-01 5.03E-02	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 6.62E-03 7.80E-04 1.26E-02 4.50E-04 1.26E-03 2.88E-04 1.26E-03 3.82E-03 7.72E-03 3.82E-03 1.23E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.26E-03
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238 U-240 Np-237 Np-239 Np-240 Pu-238	3.70E-06 8.67E-05 8.67E-05 8.67E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 2.52E-05 1.02E-03 3.17E-04 2.59E-03 2.41E-04 8.64E-04 7.12E-03 5.91E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.27E-04 5.46E-05 1.99E-04 2.80E-01 5.03E-02 1.43E-05 1.05E-01 9.49E-02 6.72E-05 2.65E-02 6.83E-02 6.83E-02 6.85E-02	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 6.49E-04 2.43E-04 1.04E-05 8.26E-04 1.77E-04 1.9E-03 3.17E-04 6.49E-01 1.77E-04 1.9E-03 3.12E-04 1.77E-04 1.9E-03 3.12E-04 1.22E-	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.17E-04 3.98E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 4.79E-05 1.02E-05 2.30E-04 2.30E-04 2.50E-01 9.65E-01 1.75E-04 6.24E-05 2.30E-04 2.80E-01 9.49E-02 7.38E-05 9.08E-02 8.48E-05 2.65E-01 9.49E-02 9.49E-02 9.49E-02 9.49E-05 9.49E-02 7.38E-05 9.65E-02 7.33E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.50E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-05 1.47E-04 2.03E-04 1.15E-03 7.99E-05 1.87E-04 2.03E-04 1.22E-03 2.82E-04 4.00E+00 1.08E-04 3.11E-01 3.00E-01 1.37E-04 2.76E-01 1.05E-04 7.70E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 4.938E-06 7.89E-04 5.93E-04 4.75E-03 4.30E-05 2.05E-04 1.16E-05 1.02E-05 5.93E-05 4.12E-05 1.04E-04 6.59E-06 1.05E-01 1.02E-01 9.36E-02 2.05E-01 1.02E-01 9.36E-02 2.05E-04 1.05E-01 1.02E-05 1.05E-01 1.02E-05 2.05E-01 1.02E-05 2.05E-01 1.02E-01 9.36E-02 2.05E-01 1.02E-01 9.36E-02 2.05E-01 1.02E-01 9.36E-02 2.05E-01 1.02E-01 9.36E-02 2.05E-05 1.02E-01 9.36E-02 2.05E-05 9.36E-02 2.05E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 9.79E-04 9.36E-03 9.79E-04 8.50E-04 8.50E-04 1.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.27E-03 1.88E-04 1.56E-01 1.56E-01 1.50E-01 9.49E-02 5.80E-01 9.49E-02 5.80E-02 5.80E-02 5.66E-02 5.57E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 1.02E-05 1.02E-05 1.10E-04 7.13E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.74E-05 1.06E-01 1.74E-05 1.06E-01 1.74E-05 1.06E-01 1.74E-05 1.06E-01 1.74E-05 1.06E-01 1.02E-01 9.48E-02 4.75E-05 2.73E-01 4.30E-05	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 5.04E-04 6.41E-03 4.44E-05 6.36E-05 7.78E-05 2.90E-05 6.01E-05 2.80E-01 1.02E-01 9.48E-02 2.56E-06 9.08E-02 7.52E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 2.23E-06 1.03E-03 6.05E-04 3.17E-04 4.81E-04 6.33E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.14E-05 3.14E-05 3.80E-05 7.01E-06 2.79E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-06 1.03E-06 1.03E-06 1.03E-01 1.03E-01 1.03E-01 1.03E-01	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.60E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.78E-03 3.17E-04 4.19E-03 3.17E-04 4.19E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04 1.05E-05 1.05E-01 1.02E-01 1.02E-01	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 3.17E-04 3.31E-03 4.28E-04 1.73E-03 9.62E-03 8.45E-05 3.26E-04 4.27E-04 4.25E-04 3.39E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+01 0.00E-01	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 1.26E-03 2.38E-04 1.64E-03 2.38E-04 1.64E-03 2.38E-04 1.65E-01 1.26E-02 1.50E-04 1.50E-04 1.50E-04 1.50E-04 1.50E-04 1.50E-04 1.50E-04 1.50E-04 1.50E-01 1.50E-01 1.50E-01 1.50E-01 1.50E-01 1.50E-01 1.50E-01
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-229 Th-230 Th-234 U-233 U-234 U-235 U-237 Np-239 Np-240 Pu-238 Pu-239	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.05E-03 1.05E-03 1.05E-03 1.05E-03 2.52E-05 1.02E-03 2.41E-04 2.59E-03 3.17E-04 2.59E-03 3.17E-04 2.58E-04 3.29E-05 1.02E-05 1.27E-04 5.91E-05 2.38E-04 3.29E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01 5.91E-05 2.80E-01 5.91E-05 2.80E-01 5.91E-05 1.02E-01 5.91E-05 5.83E-05 2.65E-02 5.83E-05 2.65E-05 5.77E-02 5.77E-02	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 4.02E-03 4.02E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.23E-04 1.04E-05 8.26E-04 1.77E-04 1.19E-03 3.12E-04 1.04E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 5.51E-04 1.04E-02 4.58E-04 5.58E-04 5.59E-01 3.99E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 3.16-0-3 3.17E-04 3.98E-03 3.28E-04 1.08E-03 3.28E-04 4.79E-05 1.75E-04 6.24E-05 2.30E-04 6.71E-05 2.30E-04 6.71E-05 1.05E-01 1.02E-01 9.49E-02 7.38E-05 1.05E-01 1.02E-01 9.49E-02 7.38E-05 1.01E-04 4.77E-02 5.37E-05	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 4.19E-03 5.80E-03 2.94E-04 1.15E-03 7.99E-05 2.59E-04 4.00E+00 1.66E-05 1.37E-04 2.32E-04 4.00E+00 1.56E+01 1.37E-04 2.76E-01 1.35E-04 1.25E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.96E-04 7.25E-04 9.38E-06 7.89E-04 1.72E-03 1.52E-04 4.76E-03 1.52E-04 4.76E-03 1.52E-04 4.76E-03 1.52E-04 1.76E-05 1.02E-05 5.93E-05 4.12E-05 1.04E-04 3.44E-05 2.79E-01 1.02E-01 9.47E-02 2.05E-04 1.05E-01 1.02E-01 9.47E-02 2.05E-05 7.92E-06 1.05E-01 1.02E-01 9.47E-02 2.05E-05 7.92E-06 1.79E-05	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 4.15E-04 4.15E-04 4.15E-04 4.15E-04 4.15E-04 6.59E-03 7.26E-03 7.26E-03 7.26E-03 7.26E-03 7.26E-03 7.26E-03 7.3E-03 7.3E-03 7.3E-03 7.3E-04 7.73E-03 7.3E-04 7.73E-05 7.75E-05 7.77E-05 7.77E-05 7.77E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 4.28E-04 4.29E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 6.73E-03 5.15E-05 2.27E-04 4.89E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 4.98E-05 1.73E-01 1.71E-05 1.06E-01 1.71E-05 1.06E-01 1.73E-01 3.73E-01 3.73E-01 3.73E-01 3.73E-01 3.73E-01 3.73E-05 3.84E-05 2.73E-01 4.89E-02 4.75E-05 5.23E-06 3.66E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.48E-07 2.39E-04 7.14E-06 5.51E-05 4.96E-05 6.36E-04 3.11E-06 1.01E-03 3.19E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.86E-05 3.76E-05 2.90E-05 6.01E-05 2.80E-01 1.02E-01 9.48E-02 5.56E-06 1.02E-01 9.48E-02 5.56E-06 5.09E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 2.23E-06 1.03E-03 4.38E-06 1.03E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.14E-05 3.80E-05 5.42E-05 0.00E+00 0.00E+00 0.00E+01 1.02E-01	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.06E-04 1.98E-03 1.94E-03 3.78E-03 3.78E-03 2.12E-03 2.12E-03 2.12E-03 3.17E-04 4.19E-03 4.19E-03 4.19E-03 4.19E-04 4.19E-04 4.49E-04 1.03E-05 6.06E-04 1.69E-04 9.64E-05 6.06E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 9.51E-02 2.75E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 3.31E-03 3.17E-04 3.31E-03 8.45E-05 1.56E-03 1.58E-03 1.71E-04 3.32E-04 1.73E-03 8.25E-04 1.73E-03 8.72E-04 1.21E-03 7.15E-04 2.25E-04 1.21E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+01 5.03E-02 3.67E-05 1.05E-01 1.03E-01	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.26E-02 4.50E-04 1.26E-02 4.50E-04 1.26E-03 2.33E-03 6.62E-03 3.80E-04 1.26E-02 4.50E-04 1.26E-02 1.26E-02 1.26E-02 1.26E-03 1.26E-02 1.26E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01 1.36E-01
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-233 U-234 U-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.22E-05 2.38E-04 3.29E-05 1.22E-05 1.2	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.74E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 9.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.551E-04 9.06E-02 4.58E-04 1.59E-01 3.59E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.160E-03 3.28E-04 4.79E-03 1.66E-04 8.88E-04 4.79E-05 1.02E-05 1.75E-04 6.24E-05 2.30E-04 6.71E-05 2.30E-01 1.02E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 5.80E-03 2.29E-03 7.99E-03 5.80E-03 1.15E-03 7.99E-05 2.59E-04 8.58E-05 1.87E-04 2.03E-04 7.65E-05 2.52E-04 1.22E-03 1.86E+00 1.56E+00 1.56E+00 1.56E+01 1.37E-04 2.76E-01 1.37E-04 2.76E-01 1.37E-04 2.76E-01 1.35E+00 1.45E+00 1.45E+00	1.25E-06 2.84E-05 3.61E-09 3.60E-04 1.31E-05 2.17E-04 1.36E-04 7.25E-04 7.35E-04 7.35E-04 1.72E-03 1.52E-04 1.72E-03 1.52E-04 1.75E-04 1.76E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-06 1.05E-01 1.02E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 7.26E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.87E-03 2.68E-04 7.73E-03 2.68E-04 7.73E-03 2.68E-04 1.7E-03 2.68E-04 1.7E-03 2.68E-04 5.68E-05 1.56E-04 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 2.80E-05 9.08E-02 5.57E-05 6.43E-05 5.77E-02 5.37E-02	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.19E-05 9.59E-04 6.73E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 1.37E-04 1.37E-04 1.37E-04 1.373E-01 1.71E-05 1.02E-01 1.71E-05 1.02E-01 1.75E-05 9.08E-02 4.75E-05 9.08E-02 4.75E-05 9.08E-02 4.75E-05 9.08E-02 1.73E-01 1.71E-05 1.06E-01 1.02E-01 9.48E-05 2.73E-01 4.30E-05 5.23E-06 3.66E-01 4.06E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 6.01E-05 6.0	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 0.223E-06 1.03E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.80E-05 5.42E-05 0.00E+00 0.	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.17E-04 4.19E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 1.56E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-04 1.73E-03 8.45E-05 1.56E-04 1.73E-04 3.39E-04 1.71E-04 3.23E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 0.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.26E-02 4.50E-04 1.26E-03 2.88E-04 0.00E+00 0.00E+00 0.00E+01 1.26E-02 1.26E-03
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-240 Pu-238 Pu-239 Pu-240 Pu-241	3.70E-06 8.67E-05 8.67E-05 6.79E-09 7.88E-04 2.45E-05 5.45E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.05E-03 2.52E-05 1.02E-03 2.52E-05 1.02E-03 2.41E-04 7.12E-03 5.91E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01 1.02E-05 1.02E-01 1.02E-05 1.02E-01 1.02E-05 1.02E-01 2.02E-01	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 4.54E-03 3.66E-04 4.54E-03 7.98E-03 2.05E-04 1.23E-03 4.02E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 1.24E-03 3.17E-04 4.26E-04 1.9E-03 3.12E-04 8.26E-04 1.9E-03 3.12E-04 8.26E-04 1.9E-03 3.12E-04 8.26E-04 1.02E-01 1.22E-04 1.22E-	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 5.68E-04 5.42E-04 1.68E-02 2.58E-05 1.49E-03 1.60E-03 3.17E-04 3.98E-03 3.28E-04 1.08E-03 9.65E-03 1.56E-04 4.79E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 7.99E-03 2.84E-04 1.55E-05 1.87E-04 8.58E-05 1.87E-04 8.58E-05 1.87E-04 8.58E-05 1.87E-04 8.58E-05 1.87E-04 1.22E-03 2.82E-04 1.22E-03 2.82E-04 1.00E-01 1.56E+00 1.56E+00 1.56E+00 1.56E+01 1.57E-04 2.76E-01	1.25E-06 2.84E-05 3.61E-09 3.60E-04 5.79E-06 3.60E-04 1.31E-05 2.17E-04 1.38E-06 7.89E-04 5.93E-04 5.93E-04 5.93E-04 5.93E-04 5.93E-04 5.93E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.27E-03 1.88E-04 5.68E-05 1.56E-04 2.80E-01 5.03E-02 1.14E-05 1.05E-01 9.49E-02 5.80E-05 9.08E-02 5.87E-05 6.43E-05 6.43E-05 6.43E-05 6.43E-05 5.65E-02 5.87E-05 6.43E-05	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 3.17E-04 2.20E-03 2.19E-04 7.96E-04 6.73E-03 5.15E-05 1.02E-05 1.73E-04 4.98E-05 1.73E-04 7.13E-01 1.71E-05 1.02E-01 9.48E-02 2.475E-05 9.08E-02 3.84E-05 2.73E-01 4.30E-05 5.23E-06 1.02E-01 9.48E-02 3.84E-05 5.23E-06 1.06E-01 4.06E-01 4.06E-01 4.06E-01 4.06E-01 4.06E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 3.17E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 1.02E-05 3.76E-05 7.78E-05 2.80E-01 5.03E-02 3.03E-06 1.02E-01 9.48E-02 2.55E-01 9.88E-02 7.52E-06 9.08E-02 2.95E-06 5.09E-06	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.64E-05 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 1.03E-03 1.99E-04 4.81E-04 4.81E-04 6.33E-03 4.38E-05 2.24E-04 0.00E+00 0.0	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 1.94E-03 3.78E-03 0.00E+00 0.00E+00 0.00E+00 1.21E-03 2.12E-03 3.17E-04 4.19E-03 4.88E-04 4.19E-03 4.88E-04 1.03E-05 4.20E-04 1.03E-05 6.06E-04 1.69E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.03E-05 1.05E-01 1.02E-01 9.51E-02 2.75E-04 9.08E-02 2.75E-04 9.08E-02 2.25E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 6.71E-05 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 6.58E-05 1.56E-03 3.17E-04 1.31E-03 4.28E-04 1.73E-03 8.45E-05 3.25E-04 8.72E-04 1.71E-04 3.39E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.05E-01 1.03E-01 1.03E-01 1.03E-01 1.03E-01	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 1.03E-04 1.61E-03 2.67E-03 1.23E-03 7.80E-04 1.26E-02 4.50E-04 1.26E-03 2.33E-03 1.26E-02 4.50E-04 1.26E-03 2.38E-04 1.26E-03 2.38E-04 1.26E-03 1.26E-01 1.38E-01 1.26E-02 1.90E-01 1.26E-02 1.90E-01 1.26E-02 1.90E-01 1.38E-01
Pm-149 Pm-149 Pm-151 Sm-151 Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-233 U-234 U-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240	3.70E-06 8.67E-05 6.79E-09 7.88E-04 2.45E-05 7.93E-04 4.35E-05 5.45E-04 1.55E-03 1.02E-03 1.02E-03 1.02E-03 2.52E-05 1.22E-05 2.38E-04 3.29E-05 1.22E-05 1.2	3.09E-05 7.36E-04 5.92E-08 4.93E-03 2.68E-04 5.13E-03 3.66E-04 4.54E-03 7.98E-03 7.98E-03 3.17E-04 6.49E-03 7.50E-04 4.11E-03 1.59E-02 1.77E-04 4.26E-04 2.43E-04 1.74E-05 8.26E-04 1.77E-04 4.64E-05 8.26E-04 1.77E-04 9.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.22E-04 1.06E-01 1.551E-04 9.06E-02 4.58E-04 1.59E-01 3.59E-01	4.37E-06 1.13E-04 6.07E-09 1.22E-03 2.77E-05 1.17E-03 6.25E-05 5.68E-04 1.68E-02 2.58E-05 1.49E-03 3.160E-03 3.28E-04 4.79E-03 1.66E-04 8.88E-04 4.79E-05 1.02E-05 1.75E-04 6.24E-05 2.30E-04 6.71E-05 2.30E-01 1.02E-01	7.71E-06 1.35E-04 1.70E-04 2.20E-03 3.50E-05 2.69E-03 2.61E-04 8.51E-04 8.80E-04 4.30E-03 4.35E-05 1.47E-03 2.29E-03 5.80E-03 2.29E-03 7.99E-03 5.80E-03 1.15E-03 7.99E-05 2.59E-04 8.58E-05 1.87E-04 2.03E-04 7.65E-05 2.52E-04 1.22E-03 1.86E+00 1.56E+00 1.56E+00 1.56E+01 1.37E-04 2.76E-01 1.37E-04 2.76E-01 1.37E-04 2.76E-01 1.35E+00 1.45E+00 1.45E+00	1.25E-06 2.84E-05 3.61E-09 3.60E-04 1.31E-05 2.17E-04 1.36E-04 7.25E-04 7.35E-04 7.35E-04 1.72E-03 1.52E-04 1.72E-03 1.52E-04 1.75E-04 1.76E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-05 1.02E-06 1.05E-01 1.02E-01	3.30E-06 8.24E-05 3.22E-09 6.52E-04 1.93E-05 6.59E-04 3.34E-05 4.50E-04 4.15E-04 1.87E-03 2.04E-05 1.26E-03 9.79E-04 9.36E-03 7.26E-03 7.26E-03 2.60E-04 7.73E-03 6.89E-05 2.51E-04 2.43E-04 1.87E-03 2.68E-04 7.73E-03 2.68E-04 7.73E-03 2.68E-04 1.7E-03 2.68E-04 1.7E-03 2.68E-04 5.68E-05 1.56E-04 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 1.02E-01 2.80E-05 9.08E-02 5.57E-05 6.43E-05 5.77E-02 5.37E-02	2.80E-06 5.99E-05 2.91E-09 5.09E-04 1.36E-05 5.37E-04 2.53E-05 4.49E-04 4.28E-04 8.97E-04 2.19E-05 9.59E-04 7.42E-04 2.19E-05 9.59E-04 6.73E-03 5.15E-05 1.02E-05 9.97E-05 4.88E-05 1.73E-04 1.37E-04 1.37E-04 1.37E-04 1.373E-01 1.71E-05 1.02E-01 1.71E-05 1.02E-01 1.75E-05 9.08E-02 4.75E-05 9.08E-02 4.75E-05 9.08E-02 4.75E-05 9.08E-02 1.73E-01 1.71E-05 1.06E-01 1.02E-01 9.48E-05 2.73E-01 4.30E-05 5.23E-06 3.66E-01 4.06E-01	2.87E-07 6.22E-06 3.13E-09 2.57E-04 5.46E-07 2.39E-04 7.14E-06 5.51E-05 6.36E-04 3.11E-06 1.01E-03 6.64E-04 2.25E-03 1.95E-04 6.41E-03 4.44E-05 2.19E-04 8.40E-06 6.01E-05 6.0	8.64E-08 1.19E-06 2.88E-09 1.58E-04 8.64E-08 1.44E-04 4.38E-06 1.67E-05 4.04E-04 0.00E+00 0.00E+00 0.00E+00 0.223E-06 1.03E-03 4.38E-05 2.24E-04 9.66E-06 1.02E-05 3.80E-05 5.42E-05 0.00E+00 0.	1.49E-05 3.55E-04 6.09E-09 2.21E-03 1.06E-04 2.31E-03 1.50E-04 1.98E-03 3.78E-03 3.78E-03 3.78E-03 3.17E-04 4.19E-05 1.21E-03 3.17E-04 4.19E-03 4.88E-04 2.15E-03 1.13E-02 1.14E-04 3.29E-04 1.05E-04	1.01E-05 2.20E-04 8.49E-08 1.55E-03 1.62E-03 1.11E-04 1.41E-03 1.36E-03 2.62E-03 0.00E+00 0.00E+00 0.00E+00 1.56E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-03 1.58E-04 1.73E-03 8.45E-05 1.56E-04 1.73E-04 3.39E-04 1.71E-04 3.23E-04	3.68E-03 2.71E-03 3.63E-04 5.06E-03 2.75E-03 7.56E-03 1.20E-03 8.13E-03 5.95E-03 7.33E-03 0.00E+00 0.00E+00 0.03E-04 1.61E-03 2.67E-03 7.80E-04 2.77E-03 1.26E-02 4.50E-04 1.26E-02 4.50E-04 1.26E-03 2.88E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+01 1.26E-02 1.83E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-03 1.43E-01 1.26E-02 1.90E-01 1.36E-01

Table A-2. Inhalation dose conversion factors based on ICRP-72.

September   Sept	Nuolido	Adronala	D Curfooo	Proin	Propet	C Wall	CI Wall	III I Wall	LLL Wall	Kidnovo	Liver	ET Pagion	Lung
1.48F-06	Nuclide Se-79	Adrenals 5.55E-04	5.55E-04	Brain 5.55E-04	5.55E-04	S Wall 6.66E-04	7.77E-04	1.96E-03	4.81E-03	1.89E-02	8.14E-03	ET Region 2.11E-02	Lung 7.40E-02
No.													
1.78E  60													
Books													
No.													
Be-86   AUTE-00   1.4Fe-70   AUTE-00   3.7Fe-70   3.7Fe-70   3.8Fe-70   AUTE-00   AU			0.00E+00	0.00E+00			0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.00E+00
No.													
Be-Price													
No.													
Ne-98													
September   Sept													
Septical													
No.													
Section   1784-100   2886-03   1784-05   2886-03   288													
Y-80   1886-07   1886-0													
Sept													
Variable   1786-60   2385-64   0.925-60   1.925-60   1.925-60   2.925-60													
SP-92	Y-91		2.33E-04		1.92E-05	1.11E-03	2.78E-03	1.67E-02	4.81E-02			2.37E-02	2.55E-01
Y-92													
Sept													
Y-83         6.28E-66         7.05E-66         4.07E-66         4.91E-66         4.91E-66 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
Ne-95m   370E-05   2.00E-04   1.74E-05   3.70E-05   8.14E-05   1.59E-04   3.59E-03   2.70E-05   3.20E-06   3.2													
Y-94   3.70E-06   3.22E-06   3.29E-06   2.89E-06   5.29E-04   1.52E-04   3.70E-05   4.44E-06   3.29E-06   3													
Y-SS         1.98E-06         1.55E-06         1.88E-06         1.89E-06         2.38E-03         2.38E-03         2.38E-03         2.38E-03         2.38E-03         2.38E-03         2.38E-03         2.28E-03         2.28E-03         2.28E-03         2.28E-03         2.28E-03         3.28E-03         3.28E-03 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
2-95													
No-96													
Y-96													
NB-977													
No-9fm													
No-999 815-10-5 226-10 2.00E-40 0.00E-40 0.00E-4													
Mo-99													
To-99m 7,03E-06 1,28E-05 4,44E-06 4,44E-06 5,39E-06 3,39E-06 3,39E-06 3,39E-06 3,39E-06 3,39E-06 3,39E-06 1,39E-07 7,40E-07 1,04E-06 4,00E-00 0,00E-00 0,00E	Mo-99	8.51E-05	9.25E-05	2.66E-05	7.77E-05	7.77E-04	1.92E-03		2.15E-02	1.04E-04	1.18E-04	1.48E-02	2.41E-02
Mo-101													
To-101 9.98E-07 1.04E-06 9.25E-07 7.40E-07 1.22E-04 2.33E-05 4.81E-06 7.77E-07 8.51E-07 7.77E-07 1.70E-03 1.58E-04 To-10-10-10-10-10-10-10-10-10-10-10-10-10-													
Mo-102													
Nuclede   Muscle   Ovaries   Pancreas   R Marrow   Skin   Spien   Testes   Thymus   Thyroid   Ulerus   Bid Wal   Eff Dose   Ser-79   5.55E-04   1.04E-03   2.89E-03   5.55E-04													
September   Sept	Tc-102	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
September   Sept	Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
B-83													
K-83m   0.00E+00													
Br-84         1.98E-05         1.52E-05         2.70E-05         1.78E-05         1.44E-05         2.11E-05         1.25E-05         1.52E-05         1.47E-05         2.20E-04           Br-85         0.00E+00         0.00E+0													
B-95   0.00E+00   0													
K-85   0.00E+00   0													
R-B-86   4.07E-03					0.00E+00								
K-Pa7													
Rb-97   Q.77F-03   Q.77F-03   Q.77F-06   Q.07F-03   Q.77F-06   Q.07F-06   Q													
KF-88													
K-P-89													
Rb-98   9.62-06   7.03E-06   1.44E-05   1.04E-05   7.03E-06   8.8E-05   8.8E-05   8.7E-09   8.5TE-04   0.00E+00   0.00E													
SF-89													
Rb-90													
SF-90   2.89E-03   2.89E-04   2.99E-04   2.99E-04   2.99E-04   2.99E-04   2.99E-04   2.99E-04   2.99E-05   2.99E-06   2													
Y-90         1.89E-07         1.89E-07         5.55E-06         1.89E-07         1.89E-07         1.89E-07         1.89E-07         1.89E-07         7.03E-03           Sr-91         0.00E+00         0.00E+00<													
Rb-91   0.00E+00   0													
SF-91													
Y-91         1.07E-05         9.99E-06         1.44E-05         2.37E-06         1.48E-05         5.18E-06         2.15E-05         1.04E-05         7.03E-06         7.70E-06         3.29E-02           Sr-92         8.51E-05         1.26E-04         9.25E-05         5.55E-06         2.29E-06         8.51E-05         8.88E-05         8.14E-05         8.14E-05         5.55E-04         5.55E-04         5.55E-04           Y-92         9.62E-06         3.07E-05         1.48E-05         6.29E-06         2.04E-06         9.62E-06         8.29E-06         2.00E-05         8.14E-06         1.07E-03           Sr-93         0.00E+00         0.0													
GF-92         8,51E-05         1,26E-04         9,25E-05         3,00E-04         6,66E-05         8,14E-05         6,29E-05         8,88E-05         8,14E-05         1,07E-04         5,55E-04         6,66E-04           Y-92         9,62E-06         3,07E-05         1,48E-05         1,07E-05         4,44E-06         1,04E-05         2,04E-06         9,62E-06         6,29E-06         2,00E-05         8,14E-06         1,07E-03           Y-93         8,14E-06         3,22E-05         9,25E-06         9,99E-06         3,63E-06         7,03E-06         2,63E-06         7,77E-06         4,81E-05         1,74E-05         9,62E-06         2,26E-03           Zr-93         4,81E-05         1,70E-05         1,26E-05         1,48E-01         4,07E-05         1,63E-05         1,74E-05         2,24E-05         1,37E-05         8,88E-06         4,07E-05         1,74E-05         2,22E-05         6,66E-03           Y-94         4,07E-06         3,66E-06         9,99E-06         3,55E-06         1,92E-06         6,66E-06         2,66E-07         5,18E-06         3,63E-06         1,74E-05         2,22E-05         6,66E-03           Y-94         4,07E-06         3,66E-06         3,55E-06         1,62E-06         6,66E-06         2,66E-07         5,18E-05	Y-91	1.07E-05	9.99E-06	1.44E-05	2.37E-04				2.15E-05	1.04E-05	7.03E-06	7.40E-06	3.29E-02
Y-92         9,62E-06         3,07E-05         1,48E-05         1,07E-05         4,44E-06         1,04E-05         2,04E-06         9,62E-06         2,20E-05         8,14E-06         1,07E-03           Y-93         8,14E-06         3,22E-05         9,25E-06         9,99E-06         3,63E-06         7,03E-06         2,63E-06         7,77E-06         4,81E-06         1,74E-05         9,62E-06         2,26E-03           Zr-93         4,81E-05         1,70E-05         1,26E-05         1,48E-01         4,07E-05         1,63E-05         8,51E-06         2,44E-05         1,74E-05         8,88E-06         4,07E-05         3,70E-02           Nb-93m         7,04E-05         2,11E-05         2,07E-05         7,40E-05         1,89E-05         4,07E-05         1,70E-05         1,74E-05         2,22E-05         6,66E-03           Nb-93m         7,40E-05         3,66E-06         9,99E-06         3,55E-06         1,99E-06         4,07E-05         1,70E-05         1,74E-05         1,74E-05         2,22E-05         6,66E-03           Y-94         4,07E-06         3,66E-06         1,99E-06         3,55E-06         1,99E-06         6,66E-06         1,11E-07         2,92E-05         1,81E-06         8,51E-07         3,48E-07         9,62E-06           Z-9													
Sr-93         0.00E+00         0.00E+00 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
Y-93         8.14E-06         3.22E-05         9.25E-06         9.99E-06         3.63E-06         7.03E-06         2.63E-06         7.77E-06         4.81E-05         1.74E-05         9.62E-06         2.26E-03           Zr-93         4.81E-05         1.70E-05         1.26E-05         1.48E-01         4.07E-05         1.63E-05         8.51E-06         2.44E-05         1.37E-05         8.88E-06         4.07E-05         3.70E-02         3.70E-02         3.70E-02         3.70E-02         3.70E-02         3.70E-02         1.74E-05         2.22E-05         6.66E-03         3.70E-02         1.74E-05         2.22E-05         6.66E-03         3.70E-02         1.74E-05         2.22E-05         6.66E-03         3.70E-03         3.70E-03         3.70E-03         3.70E-03         3.70E-03         3.70E-06         1.82E-06         6.66E-06         2.66E-07         5.18E-06         3.63E-06         3.11E-06         9.99E-07         1.70E-04         4.70E-05         1.81E-06         8.81E-07         2.66E-06         1.11E-07         2.92E-06         1.81E-06         8.51E-07         3.48E-07         3.48E-03         3.44E-03         3.62E-06         1.81E-06         8.51E-07         3.48E-07         3.48E-03         3.44E-03         8.51E-07         3.56E-02         1.18E-03         3.56E-06         1.77E-05													
Nb-93m							7.03E-06		7.77E-06		1.74E-05		
Y-94         4_07E-06         3.66E-06         9.99E-06         3.55E-06         1.92E-06         6.66E-06         2.66E-07         5.18E-06         3.63E-06         9.99E-07         1.70E-04           Zr-95         1.81E-06         1.04E-06         3.70E-03         3.70E-03         3.70E-03         3.48E-03         2.66E-06         1.11E-07         2.92E-06         1.81E-06         8.51E-07         3.48E-07         9.62E-05           Nb-95         2.55E-03         2.66E-03         3.70E-03         1.26E-03         4.81E-04         1.48E-03         1.48E-03         2.37E-03         8.51E-07         4.44E-04         6.62E-06           V-96         0.00E+00         0.0													
Y-95         1.81E-06         1.04E-06         3.70E-06         1.63E-06         8.88E-07         2.66E-06         1.11E-07         2.92E-06         1.81E-06         8.51E-07         3.48E-07         9.62E-05           Zr-95         2.55E-03         2.66E-04         1.33E-03         3.70E-03         8.88E-03         1.44E-03         3.44E-03         6.29E-04         5.18E-03         2.37E-03         1.59E-03         1.85E-02           Nb-95         9.62E-04         1.33E-03         1.52E-03         4.81E-04         0.00E+00													
Zr-95         2.55E-03         2.66E-03         3.70E-03         8.88E-03         1.44E-03         3.44E-03         6.29E-04         5.18E-03         2.37E-03         1.59E-03         1.18E-03         1.85E-02           Nb-95         9.62E-04         1.33E-03         1.52E-03         1.26E-03         4.81E-04         1.48E-03         2.48E-03         8.51E-04         6.29E-04         4.44E-04         6.66E-03           Zr-97         2.26E-04         8.88E-04         2.29E-04         4.07E-04         1.07E-04         1.85E-04         9.99E-05         2.15E-04         1.37E-04         4.44E-04         2.96E-04         5.18E-03           Nb-97         9.25E-06         2.04E-05         9.62E-06         4.07E-06         1.37E-05         1.11E-06         9.99E-06         6.66E-06         1.55E-05         4.81E-06         2.70E-04           Nb-97m         0.00E+00         0.00E+00 </td <td></td>													
Nb-95 9,62E-04 1,33E-03 1,52E-03 1,26E-03 4,81E-04 1,48E-03 1,48E-04 2,48E-03 8,51E-04 6,66E-03 2.79F 0,00E+00		2.55E-03											
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Nb-95	9.62E-04	1.33E-03	1.52E-03	1.26E-03	4.81E-04	1.48E-03	1.48E-04	2.48E-03	8.51E-04	6.29E-04		6.66E-03
Nb-97 9,28E-06 2.04E-05 2.04E-05 9,62E-06 4.07E-06 1.37E-05 1.11E-06 9.99E-06 6.66E-06 1.55E-05 4.81E-06 2.70E-04 Nb-97m 0.00E+00													
Nb-97m 0.00E+00 0.00E													
Nb-98m 0.00E+00 0.00E													
Mo-99         7,40E-05         3,15E-04         8,14E-05         9,99E-05         3,18E-05         7,40E-05         3,22E-05         1,04E-04         4,44E-05         1,48E-04         1,07E-04         4,81E-03           Tc-99         3,59E-05         1,04E-04         1,07E-04         4,81E-03           Tc-99m         8,88E-06         3,11E-05         1,30E-05         9,99E-06         3,33E-06         9,25E-06         2,29E-06         8,51E-06         2,96E-05         2,00E-05         1,04E-05         1,14E-04         1,1E-04           Mo-101         4,81E-06         4,07E-06         1,22E-05         8,14E-06         2,74E-07         6,29E-06         4,44E-05         1,04E-04         1,04E-05         1,04E-05         1,15E-06         1,0E-04         4,0TE-06         1,0E-04         4,0TE-06         2,0E-06         8,14E-07         6,29E-06         4,44E-05         2,00E-05         1,04E-05         1,15E-06         1,0E-04         4,4E-08         3,5E-06         1,0E-04         1,0E-04         1,0E-04         4,0TE-06         1,0E-04         1,0E-05         9,0E-05         3,3E-06         5,5E-06													
Tc-99m 8.88E-06 3.11E-05 1.30E-05 9.99E-06 3.33E-06 9.25E-06 2.29E-06 8.51E-06 2.96E-05 2.00E-05 1.04E-05 1.11E-04 Mo-101 4.81E-06 4.07E-06 1.22E-05 4.07E-06 2.26E-06 8.14E-06 2.74E-07 6.29E-06 4.44E-06 3.52E-06 1.55E-06 1.67E-04 Tc-101 1.11E-06 8.14E-07 2.59E-06 9.62E-07 5.18E-07 1.74E-06 1.55E-07 1.33E-06 5.55E-06 7.03E-07 3.29E-07 7.70E-05 Mo-102 0.00E+00	Mo-99	7.40E-05	3.15E-04	8.14E-05	9.99E-05	3.18E-05	7.40E-05	3.22E-05	1.04E-04	4.44E-05	1.48E-04	1.07E-04	4.81E-03
Mo-101 4.81E-06 4.07E-06 1.22E-05 4.07E-06 2.26E-06 8.14E-06 2.74E-07 6.29E-06 4.44E-06 3.52E-06 1.15E-06 1.67E-04 1.11E-06 8.14E-07 2.59E-06 9.62E-07 5.18E-07 1.74E-06 1.55E-07 1.33E-06 5.55E-06 7.03E-07 3.29E-07 7.77E-05 1.00E-00 0.00E+00 0.00E													
Tc-101 1.11E-06 8.14E-07 2.59E-06 9.62E-07 5.18E-07 1.74E-06 1.55E-07 1.33E-06 5.55E-06 7.03E-07 3.29E-07 7.77E-05 0.00E+00													
Mo-102 0.00E+00													
						0.00E+00							
	Tc-102	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-2. Inhalation dose conversion factors based on ICRP-72.

Nuolido	Adropolo	P. Curfooo	Proin	Proont	S Wall	SI Wall	LILLWall	LLI Wall	Kidnova	Liver	ET Pogion	Lung
Tc-103	0.00E+00	B Surface 0.00E+00	0.00E+00									
Ru-103	1.48E-03	6.29E-04	1.33E-04	1.48E-03	9.62E-04	1.30E-03	4.07E-03	1.07E-02	5.18E-04	1.22E-03	2.89E-02	8.14E-02
Rh-103m	7.77E-09	1.81E-08	4.81E-09	7.40E-09	3.15E-05	1.92E-05	1.11E-05	1.74E-06	6.29E-09	1.15E-08	3.40E-05	6.66E-05
Tc-104 Mo-105	6.66E-06 0.00E+00	5.92E-06 0.00E+00	5.92E-06 0.00E+00	5.18E-06 0.00E+00	5.55E-04 0.00E+00	1.30E-04 0.00E+00	3.55E-05 0.00E+00	6.29E-06 0.00E+00	5.92E-06 0.00E+00	5.18E-06 0.00E+00	2.85E-03 0.00E+00	2.78E-04 0.00E+00
Tc-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-105	3.29E-05	3.18E-05	2.15E-05	2.33E-05	7.03E-04	1.07E-03	2.33E-03	1.96E-03	4.07E-05	3.55E-05	9.25E-03	3.37E-03
Rh-105	1.92E-05	1.96E-05	1.07E-05	1.59E-05	2.92E-04	6.66E-04	2.89E-03	5.55E-03	1.85E-05	1.96E-05	7.77E-03	9.62E-03
Rh-105m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106 Rh-106	4.07E-03 0.00E+00	2.00E-03 0.00E+00	9.25E-04 0.00E+00	4.07E-03 0.00E+00	4.81E-03 0.00E+00	7.77E-03 0.00E+00	4.07E-02 0.00E+00	1.22E-01 0.00E+00	1.74E-03 0.00E+00	3.40E-03 0.00E+00	8.14E-02 0.00E+00	1.96E+00 0.00E+00
Pd-107	1.07E-07	1.59E-06	1.07E-07	1.07E-07	1.89E-05	4.81E-05	2.85E-04	8.51E-04	7.03E-05	3.70E-05	4.81E-04	1.78E-02
Rh-109	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-109	8.51E-07	3.15E-06	3.70E-07	7.40E-07	7.03E-04	1.48E-03	5.18E-03	7.03E-03	1.18E-05	6.66E-06	9.25E-03	9.25E-03
Ag-109m Ag-110m	0.00E+00 3.29E-02	0.00E+00 1.33E-02	0.00E+00 2.70E-03	0.00E+00 3.52E-02	0.00E+00 1.81E-02	0.00E+00 7.40E-03	0.00E+00 1.18E-02	0.00E+00 1.92E-02	0.00E+00 1.22E-02	0.00E+00 3.03E-02	0.00E+00 1.18E-01	0.00E+00 2.63E-01
Ag-111	2.37E-05	1.74E-05	8.88E-06	2.29E-05	6.29E-04	1.55E-03	8.88E-03	2.33E-02	1.55E-05	2.07E-04	1.15E-02	4.81E-02
Cd-113m	7.77E-03	7.77E-03	7.77E-03	7.77E-03	8.14E-03	8.88E-03	1.33E-02	2.33E-02	1.26E+00	2.18E-01	1.55E-01	6.29E-01
Cd-115m	3.29E-04	2.92E-04	2.74E-04	3.11E-04	1.41E-03	2.92E-03	1.59E-02	4.44E-02	4.07E-02	7.40E-03	2.11E-02	2.15E-01
Sn-123 Sb-124	4.44E-04 5.18E-03	8.88E-03 7.03E-03	4.07E-04 8.51E-04	4.44E-04 5.18E-03	1.26E-03 3.63E-03	2.59E-03 4.44E-03	1.44E-02 1.44E-02	4.07E-02 3.59E-02	4.07E-04 2.29E-03	4.44E-04 4.81E-03	2.41E-02 6.66E-02	2.29E-01 1.63E-01
Sn-125	3.40E-04	2.37E-03	1.30E-04	3.26E-04	1.63E-03	3.70E-03	2.04E-02	5.55E-02	2.15E-04	2.92E-04	1.85E-02	7.40E-02
Sb-125	4.44E-03	3.22E-02	1.07E-03	3.70E-03	2.55E-03	2.22E-03	4.81E-03	1.07E-02	2.04E-03	5.18E-03	4.07E-02	1.18E-01
Te-125m	1.78E-04	2.18E-02	7.40E-05	1.85E-04	3.00E-04	5.92E-04	2.92E-03	8.14E-03	8.88E-04	1.92E-04	2.29E-02	1.07E-01
Sn-126	2.96E-02	1.04E-01	1.41E-02	2.33E-02	1.78E-02	1.78E-02	3.66E-02	8.14E-02	1.70E-02	2.26E-02	1.41E-01	6.66E-01
Sb-126 Sb-127	2.92E-03 2.96E-04	2.59E-03 5.18E-04	5.92E-04 1.11E-04	2.85E-03 2.78E-04	2.74E-03 9.25E-04	5.18E-03 2.29E-03	1.30E-02 1.07E-02	2.89E-02 2.85E-02	1.44E-03 2.18E-04	2.66E-03 3.55E-04	8.88E-02 3.00E-02	6.29E-02 4.44E-02
Te-127	4.07E-06	9.62E-06	4.07E-06	4.07E-06	3.33E-04	5.92E-04	1.81E-03	1.89E-03	1.26E-05	4.44E-06	4.81E-03	3.26E-03
Te-127m	2.26E-04	3.70E-02	1.67E-04	2.15E-04	3.70E-04	7.77E-04	5.92E-03	2.00E-02	2.78E-03	2.15E-04	3.63E-02	2.18E-01
Sb-129	5.92E-05	7.77E-05	4.07E-05	4.44E-05	1.04E-03	1.92E-03	4.07E-03	2.59E-03	7.03E-05	6.66E-05	1.37E-02	3.63E-03
Te-129	1.63E-06	1.89E-06	1.41E-06	1.37E-06	4.81E-04	3.40E-04	2.33E-04	4.44E-05	1.92E-06	1.55E-06	2.66E-03	6.66E-04
Te-129m I-129	3.66E-04	1.26E-02	2.33E-04 2.59E-04	3.40E-04	1.04E-03	2.48E-03	1.48E-02	4.07E-02 7.40E-04	3.55E-03	3.33E-04 2.18E-04	2.63E-02	1.81E-01
Sn-130	2.22E-04 0.00E+00	7.40E-04 0.00E+00	0.00E+00	2.04E-04 0.00E+00	2.66E-04 0.00E+00	2.22E-04 0.00E+00	4.07E-04 0.00E+00	0.00E+00	2.15E-04 0.00E+00	0.00E+00	5.18E-03 0.00E+00	3.22E-04 0.00E+00
Sn-130m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-130	1.30E-04	2.11E-04	2.33E-04	1.18E-04	4.81E-04	1.41E-04	1.52E-04	1.81E-04	1.18E-04	1.22E-04	3.03E-02	3.00E-04
Sb-131	1.07E-05	1.04E-05	8.51E-06	7.77E-06	5.18E-04	2.33E-04	1.15E-04	5.55E-05	9.62E-06	8.51E-06	4.07E-03	6.29E-04
Te-131 Te-131m	2.89E-06 3.07E-04	2.78E-06 5.92E-04	2.11E-06 1.63E-04	2.18E-06 2.59E-04	3.22E-04 1.07E-03	1.04E-04 2.37E-03	4.07E-05 7.77E-03	3.03E-05 1.41E-02	2.44E-06 4.07E-04	2.33E-06 3.11E-04	2.63E-03 3.70E-02	4.07E-04 1.85E-02
I-131	9.25E-05	2.55E-04	3.00E-04	1.18E-04	2.66E-04	8.51E-05	1.15E-04	1.89E-04	8.14E-05	8.88E-05	1.74E-02	3.15E-04
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-132m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Te-132 I-132	8.88E-04 5.92E-05	1.41E-03 7.03E-05	3.70E-04 7.03E-05	8.51E-04 4.81E-05	1.41E-03 4.81E-04	4.07E-03 6.66E-05	1.52E-02 6.66E-05	3.48E-02 6.29E-05	7.77E-04 5.55E-05	8.51E-04 5.18E-05	6.29E-02 9.99E-03	3.70E-02 1.81E-04
Sb-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
Tc-103 Ru-103	0.00E+00 6.66E-04	0.00E+00 8.88E-04	0.00E+00 1.11E-03	0.00E+00 8.51E-04	0.00E+00 3.29E-04	0.00E+00 1.04E-03	0.00E+00 1.11E-04	0.00E+00 1.78E-03	0.00E+00 5.92E-04	0.00E+00 4.07E-04	0.00E+00 3.00E-04	0.00E+00 1.15E-02
Rh-103m	3.40E-08	5.55E-08	4.07E-08	8.14E-09	6.29E-09	1.48E-08	4.44E-09	6.29E-09	4.81E-09	2.11E-08	1.18E-08	1.15E-05
Tc-104	7.03E-06	6.29E-06	1.67E-05	6.29E-06	3.66E-06	1.15E-05	1.04E-06	9.25E-06	3.26E-05	5.55E-06	2.41E-06	1.74E-04
Mo-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tc-105 Ru-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rh-105	4.07E-05 2.11E-05	1.41E-04 7.77E-05	5.92E-05 2.18E-05	4.81E-05 2.55E-05	1.70E-05 1.07E-05	4.07E-05 1.89E-05	9.62E-06 1.11E-05	3.70E-05 2.18E-05	2.52E-05 1.33E-05	8.51E-05 4.07E-05	3.70E-05 3.22E-05	9.62E-04 1.67E-03
Rh-105m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	2.04E-03	1.22E-03	3.07E-03	2.44E-03	1.37E-03	2.96E-03	8.14E-04	4.81E-03	2.00E-03	9.99E-04	1.04E-03	2.44E-01
Rh-106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107 Rh-109	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	5.92E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.07E-07 0.00E+00	1.30E-06 0.00E+00	2.18E-03 0.00E+00
Pd-109	2.07E-06	1.11E-05	1.33E-06	1.55E-06	4.81E-07	9.99E-07	3.55E-07	8.88E-07	4.44E-07	2.66E-06	2.85E-06	1.96E-03
Ag-109m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ag-110m	1.44E-02	6.29E-03	2.41E-02	1.81E-02	7.77E-03	2.37E-02	8.88E-04	4.07E-02	1.37E-02	3.37E-03	2.22E-03	4.44E-02
Ag-111 Cd-113m	1.78E-05 7.77E-03	4.81E-05 7.77E-03	2.15E-05 7.77E-03	2.15E-05 7.77E-03	1.07E-05 7.77E-03	1.96E-05 7.77E-03	9.62E-06 7.77E-03	2.78E-05 7.77E-03	1.37E-05 7.77E-03	2.48E-05 7.77E-03	1.92E-05 7.77E-03	7.40E-03 1.15E-01
Cd-115m	2.92E-04	3.07E-04	3.15E-04	3.00E-04	2.81E-04	3.15E-04	2.74E-04	3.22E-04	2.89E-04	2.89E-04	2.81E-04	2.85E-02
Sn-123	4.07E-04	4.07E-04	4.44E-04	3.18E-03	4.07E-04	4.44E-04	4.07E-04	4.44E-04	4.07E-04	4.07E-04	6.66E-04	3.00E-02
Sb-124	2.55E-03	3.26E-03	4.07E-03	4.44E-03	1.44E-03	3.70E-03	5.92E-04	6.29E-03	2.41E-03	1.70E-03	1.59E-03	2.41E-02
Sn-125	2.33E-04	5.18E-04	2.78E-04	1.52E-03	1.48E-04	2.66E-04	1.15E-04	3.70E-04	1.92E-04	2.74E-04	4.07E-04	1.26E-02
Sb-125 Te-125m	2.22E-03 1.44E-04	1.89E-03 2.07E-04	3.29E-03 1.07E-04	6.29E-03 1.89E-03	1.30E-03 7.03E-05	3.00E-03 1.44E-04	7.77E-04 5.55E-05	4.44E-03 1.55E-04	2.04E-03 1.15E-03	1.33E-03 7.77E-05	1.18E-03 1.74E-04	1.78E-02 1.41E-02
Sn-126	1.74E-02	1.52E-02	2.26E-02	5.18E-02	1.18E-02	2.07E-02	9.25E-03	2.78E-02	1.70E-02	1.26E-02	1.15E-02	1.04E-01
Sb-126	1.67E-03	4.44E-03	2.29E-03	2.59E-03	8.14E-04	2.15E-03	5.55E-04	3.40E-03	1.33E-03	2.15E-03	1.67E-03	1.37E-02
Sb-127	2.52E-04	9.25E-04	2.85E-04	5.55E-04	1.26E-04	2.48E-04	1.18E-04	3.40E-04	1.70E-04	4.44E-04	4.07E-04	7.77E-03
Te-127	4.44E-06	5.55E-06 2.11E-04	4.44E-06	9.25E-06	4.07E-06 1.59E-04	4.44E-06 1.96E-04	4.07E-06	4.44E-06 2.07E-04	1.55E-05 3.70E-03	4.81E-06	3.03E-05	7.40E-04
Te-127m Sb-129	1.96E-04 7.03E-05	2.11E-04 2.26E-04	1.89E-04 9.99E-05	9.99E-03 9.25E-05	3.44E-05	7.40E-05	1.48E-04 2.07E-05	7.03E-05	4.81E-05	1.63E-04 1.44E-04	4.44E-04 9.25E-05	2.92E-02 1.33E-03
Te-129	1.78E-06	2.74E-06	2.78E-06	1.85E-06	1.26E-06	2.11E-06	9.99E-07	1.74E-06	1.85E-06	2.26E-06	4.81E-06	2.15E-04
Te-129m	2.92E-04	3.63E-04	3.18E-04	5.55E-03	2.37E-04	3.15E-04	2.18E-04	3.63E-04	4.81E-03	2.66E-04	7.03E-04	2.59E-02
I-129	5.55E-04	2.29E-04	2.22E-04	2.55E-04	2.55E-04	2.18E-04	2.07E-04	3.15E-04	3.70E+00	2.26E-04	7.77E-04	1.89E-01
Sn-130 Sn-130m	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00
I-130	2.22E-04	1.52E-04	1.67E-04	1.89E-04	1.30E-04	1.37E-04	1.18E-04	2.63E-04	6.66E-02	2.04E-04	1.74E-03	3.59E-03
Sb-131	1.11E-05	1.48E-05	2.55E-05	1.07E-05	5.55E-06	1.74E-05	1.85E-06	1.37E-05	2.29E-04	1.18E-05	7.03E-06	2.63E-04
Te-131	2.89E-06	3.70E-06	6.29E-06	2.74E-06	1.44E-06	4.44E-06	6.29E-07	3.59E-06	2.52E-04	2.92E-06	2.41E-06	1.70E-04
Te-131m	3.26E-04	1.22E-03	3.44E-04	4.44E-04	1.55E-04	2.96E-04	1.48E-04	3.66E-04	1.33E-02	5.92E-04	5.55E-04	5.18E-03
I-131 Xe-131m	2.59E-04 0.00E+00	8.88E-05 0.00E+00	9.99E-05 0.00E+00	2.04E-04 0.00E+00	1.37E-04 0.00E+00	9.25E-05 0.00E+00	7.03E-05 0.00E+00	3.15E-04 0.00E+00	7.77E-01 0.00E+00	1.04E-04 0.00E+00	1.37E-03 0.00E+00	4.07E-02 0.00E+00
Sb-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00 0.00E+00	0.00E+00
Sb-132m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Te-132	8.14E-04	2.89E-03	8.51E-04	1.04E-03	4.07E-04	7.77E-04	4.44E-04	1.04E-03	2.37E-02	1.41E-03	3.03E-03	1.11E-02
I-132 Sh-133	7.40E-05	5.92E-05	8.51E-05	6.66E-05	4.81E-05	6.66E-05	4.81E-05	8.51E-05	7.03E-03	7.40E-05	6.29E-04	7.40E-04
Sb-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-2. Inhalation dose conversion factors based on ICRP-72.

Nuclide	Adrenals	B Surface	Brain	Breast	S Wall	SI Wall	ULI Wall	LLI Wall	Kidneys	Liver	ET Region	Lung
Te-133	2.96E-06	2.89E-06	2.66E-06	2.33E-06	1.89E-04	4.81E-05	6.66E-05	9.62E-05	2.63E-06	2.48E-06	2.00E-03	2.33E-04
Te-133m	2.89E-05	2.52E-05	2.11E-05	2.04E-05	8.14E-04	5.18E-04	5.92E-04	5.18E-04	2.96E-05	2.52E-05	7.40E-03	1.04E-03
I-133 Xe-133	7.77E-05 0.00E+00	1.15E-04 0.00E+00	1.26E-04 0.00E+00	7.40E-05 0.00E+00	4.44E-04 0.00E+00	8.51E-05 0.00E+00	1.11E-04 0.00E+00	1.41E-04 0.00E+00	7.40E-05 0.00E+00	7.40E-05 0.00E+00	1.48E-02 0.00E+00	2.18E-04 0.00E+00
Xe-133m	0.00E+00											
Te-134	2.66E-05	2.37E-05	1.85E-05	1.81E-05	5.92E-04	4.81E-04	4.07E-04	9.62E-05	2.96E-05	2.44E-05 2.59E-05	7.03E-03	9.25E-04
I-134 Cs-134	3.03E-05 3.70E-02	3.29E-05 3.55E-02	3.29E-05 2.78E-02	2.33E-05 2.55E-02	3.70E-04 3.33E-02	3.40E-05 3.70E-02	3.22E-05 3.59E-02	2.66E-05 4.07E-02	2.74E-05 3.48E-02	3.52E-02	5.55E-03 8.14E-02	1.41E-04 3.15E-02
Cs-134m	1.33E-05	1.48E-05	1.18E-05	1.07E-05	8.88E-05	1.48E-05	1.59E-05	1.48E-05	1.26E-05	1.30E-05	2.48E-03	1.26E-04
I-135	7.77E-05	1.07E-04	1.15E-04	7.03E-05	4.07E-04	8.51E-05	9.62E-05	9.99E-05	7.40E-05	7.40E-05	1.48E-02	2.07E-04
Xe-135 Xe-135m	0.00E+00 0.00E+00											
Cs-135	3.44E-03	3.44E-03	3.44E-03	3.44E-03	3.52E-03	3.44E-03	3.70E-03	4.81E-03	3.44E-03	3.44E-03	7.40E-03	3.52E-03
Cs-136 Xe-137	5.92E-03 0.00E+00	5.92E-03 0.00E+00	4.44E-03 0.00E+00	4.07E-03 0.00E+00	5.55E-03 0.00E+00	5.92E-03 0.00E+00	5.92E-03 0.00E+00	6.29E-03 0.00E+00	5.55E-03 0.00E+00	5.55E-03 0.00E+00	7.03E-02 0.00E+00	5.18E-03 0.00E+00
Cs-137	2.52E-02	2.44E-02	2.11E-02	2.00E-02	2.37E-02	2.52E-02	2.55E-02	2.96E-02	2.41E-02	2.41E-02	4.81E-02	2.29E-02
Ba-137m	0.00E+00											
Xe-138 Cs-138	0.00E+00 2.15E-05	0.00E+00 2.26E-05	0.00E+00 2.26E-05	0.00E+00 1.81E-05	0.00E+00 4.44E-04	0.00E+00 2.85E-05	0.00E+00 2.33E-05	0.00E+00 1.78E-05	0.00E+00 2.00E-05	0.00E+00 1.92E-05	0.00E+00 3.37E-03	0.00E+00 1.33E-04
Cs-139	0.00E+00											
Ba-139	8.14E-06	5.55E-05	8.14E-06	7.77E-06	4.81E-04	3.63E-04	8.88E-04	2.04E-04	8.14E-06	8.14E-06	1.85E-03	1.33E-04
Cs-140 Ba-140	0.00E+00 1.07E-03	0.00E+00 9.99E-03	0.00E+00 7.03E-04	0.00E+00 4.44E-04	0.00E+00 9.99E-04	0.00E+00 2.52E-03	0.00E+00 1.48E-02	0.00E+00 4.81E-02	0.00E+00 9.25E-04	0.00E+00 6.29E-04	0.00E+00 3.18E-02	0.00E+00 7.40E-04
La-140	5.18E-04	4.81E-04	2.18E-04	4.07E-04	1.70E-03	4.07E-03	1.30E-02	2.48E-02	4.81E-04	1.41E-03	5.18E-02	1.48E-02
Ba-141	5.92E-06	2.85E-05	5.92E-06	4.81E-06	2.37E-04	1.18E-04	3.70E-04	1.78E-04	5.92E-06	5.55E-06	1.85E-03	1.07E-04
La-141 Ce-141	6.66E-06 2.26E-04	4.81E-05 3.70E-04	4.81E-06 1.44E-05	5.55E-06 2.18E-04	1.26E-03 4.07E-04	1.81E-03 9.25E-04	3.29E-03 4.81E-03	1.92E-03 1.37E-02	5.92E-06 7.03E-05	8.14E-05 2.96E-04	3.70E-03 2.15E-02	2.63E-03 1.22E-01
Ba-142	7.03E-06	1.52E-05	7.03E-06	4.81E-06	1.22E-04	7.40E-05	1.67E-04	4.44E-05	7.77E-06	6.66E-06	2.07E-03	8.14E-05
La-142	4.07E-05	3.52E-05	2.96E-05	2.92E-05	1.07E-03	8.88E-04	8.51E-04	2.37E-04	4.44E-05	4.81E-05	8.51E-03	9.99E-04
La-143 Ce-143	9.99E-07 5.18E-05	1.81E-06 6.66E-05	7.40E-07 2.18E-05	8.14E-07 4.81E-05	3.22E-04 8.51E-04	7.77E-05 2.00E-03	7.03E-05 8.51E-03	1.18E-04 1.74E-02	9.25E-07 5.18E-05	7.03E-06 6.66E-05	1.59E-03 1.44E-02	3.15E-04 1.96E-02
Pr-143	5.55E-08	8.51E-06	5.55E-08	5.55E-08	5.55E-04	1.37E-03	8.14E-03	2.26E-02	1.44E-05	7.03E-05	1.26E-02	7.03E-02
Ce-144	9.99E-04	7.40E-03	2.96E-04	9.99E-04	2.55E-03	6.29E-03	3.70E-02	1.11E-01	4.81E-04	2.15E-02	1.11E-01	1.55E+00
Pr-144 Pr-144m	9.62E-08 0.00E+00	8.14E-08 0.00E+00	8.88E-08 0.00E+00	7.77E-08 0.00E+00	3.70E-04 0.00E+00	8.51E-05 0.00E+00	1.59E-05 0.00E+00	8.51E-07 0.00E+00	8.14E-08 0.00E+00	7.40E-08 0.00E+00	1.63E-03 0.00E+00	2.41E-04 0.00E+00
Ce-145	0.00E+00											
Pr-145	6.66E-07 0.00E+00	8.14E-07	4.44E-07	5.18E-07	9.99E-04	1.70E-03	4.07E-03 0.00E+00	3.15E-03	1.26E-06	1.63E-06	4.44E-03	3.03E-03
Ce-146 Pr-146	0.00E+00 0.00E+00											
Ce-147	0.00E+00											
Pr-147 Nd-147	2.26E-06 1.55E-04	2.41E-06 3.63E-04	2.00E-06 1.81E-05	1.70E-06 1.59E-04	2.07E-04 5.92E-04	4.07E-05 1.41E-03	1.48E-05 7.40E-03	1.85E-05 1.96E-02	1.78E-06 6.29E-05	1.74E-06 2.29E-04	2.15E-03 1.85E-02	2.74E-04 7.03E-02
Pm-147	2.55E-07	1.81E-02	9.99E-08	2.41E-07	1.22E-04	3.03E-04	1.85E-03	5.55E-03	1.44E-07	4.81E-03	6.66E-02	1.44E-01
Pr-148	0.00E+00											
Pm-148 Pm-148m	2.89E-04 6.29E-03	1.85E-04 3.03E-03	7.03E-05 5.18E-04	3.00E-04 6.66E-03	1.55E-03 3.70E-03	3.70E-03 4.07E-03	1.85E-02 9.62E-03	4.81E-02 2.18E-02	1.78E-04 2.33E-03	3.00E-04 5.55E-03	2.37E-02 7.77E-02	4.81E-02 1.44E-01
1 111 140111	0.232 00	0.002 00	0.10L 04	0.002 00	0.70E 00		3.02L 03	2.102 02	2.002 00	0.00L 00	7.772 02	
Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
Te-133 Te-133m	3.44E-06 3.15E-05	5.55E-06 6.66E-05	6.29E-06 6.29E-05	3.29E-06 3.18E-05	1.67E-06 1.48E-05	4.44E-06 4.44E-05	7.03E-07 6.66E-06	4.07E-06 3.44E-05	2.00E-04 9.25E-04	3.33E-06 4.81E-05	4.44E-06 3.48E-05	1.18E-04 5.18E-04
I-133	1.18E-04	8.51E-05	8.88E-05	1.04E-04	8.14E-05	7.77E-05	7.03E-05	1.33E-04	1.52E-01	1.04E-04	2.04E-03	7.77E-03
Xe-133	0.00E+00											
Xe-133m Te-134	0.00E+00 2.92E-05	0.00E+00 6.66E-05	0.00E+00 5.92E-05	0.00E+00 3.03E-05	0.00E+00 1.37E-05	0.00E+00 4.07E-05	0.00E+00 5.92E-06	0.00E+00 3.07E-05	0.00E+00 1.30E-04	0.00E+00 5.18E-05	0.00E+00 3.48E-05	0.00E+00 4.07E-04
I-134	3.44E-05	2.66E-05	4.81E-05	3.11E-05	2.22E-05	3.70E-05	2.04E-05	4.07E-05	1.33E-03	3.00E-05	1.96E-04	2.89E-04
Cs-134 Cs-134m	3.11E-02 1.26E-05	3.70E-02 1.33E-05	3.70E-02 1.41E-05	3.33E-02 1.22E-05	2.33E-02 1.04E-05	3.48E-02 1.30E-05	3.11E-02 1.18E-05	3.33E-02 1.30E-05	3.33E-02 1.26E-05	4.07E-02 1.33E-05	3.63E-02 1.37E-05	3.55E-02 9.62E-05
I-135	1.11E-04	8.51E-05	9.99E-05	9.62E-05	7.40E-05	8.51E-05	7.03E-05	1.33E-04	3.03E-02	1.07E-04	1.22E-03	1.70E-03
Xe-135	0.00E+00											
Xe-135m Cs-135	0.00E+00 3.44E-03	0.00E+00 4.07E-03	0.00E+00 3.66E-03									
Cs-136	4.81E-03	5.92E-03	6.29E-03	5.18E-03	3.55E-03	5.55E-03	4.81E-03	5.55E-03	5.55E-03	6.29E-03	5.92E-03	7.03E-03
Xe-137	0.00E+00											
Cs-137 Ba-137m	2.26E-02 0.00E+00	2.55E-02 0.00E+00	2.55E-02 0.00E+00	2.33E-02 0.00E+00	1.92E-02 0.00E+00	2.41E-02 0.00E+00	2.26E-02 0.00E+00	2.33E-02 0.00E+00	2.33E-02 0.00E+00	2.59E-02 0.00E+00	2.59E-02 0.00E+00	2.48E-02 0.00E+00
Xe-138	0.00E+00											
Cs-138	2.29E-05	1.78E-05	3.33E-05	2.15E-05	1.70E-05	2.66E-05	1.48E-05	2.70E-05	2.44E-05	1.78E-05	1.59E-05	1.67E-04
Cs-139 Ba-139	0.00E+00 8.14E-06	0.00E+00 9.25E-06	0.00E+00 8.88E-06	0.00E+00 5.55E-05	0.00E+00 7.77E-06	0.00E+00 8.51E-06	0.00E+00 7.77E-06	0.00E+00 8.14E-06	0.00E+00 8.14E-06	0.00E+00 8.88E-06	0.00E+00 7.77E-05	0.00E+00 2.04E-04
Cs-140	0.00E+00											
Ba-140	8.14E-04	2.48E-03	8.14E-04	7.03E-03	4.81E-04	6.29E-04	5.18E-04	5.92E-04	5.92E-04	1.26E-03	1.26E-03	5.92E-03
La-140 Ba-141	4.81E-04 6.29E-06	2.00E-03 7.03E-06	5.55E-04 9.25E-06	6.66E-04 2.66E-05	2.37E-04 4.81E-06	4.44E-04 7.40E-06	2.11E-04 4.07E-06	5.55E-04 7.03E-06	3.00E-04 6.29E-06	9.62E-04 6.29E-06	6.29E-04 2.92E-05	5.55E-03 1.30E-04
La-141	5.92E-06	9.62E-06	7.03E-06	1.37E-05	4.81E-06	6.29E-06	4.07E-06	6.29E-06	5.18E-06	7.40E-06	5.18E-06	8.51E-04
Ce-141 Ba-142	1.04E-04 8.51E-06	1.59E-04 1.44E-05	1.67E-04 1.18E-05	1.37E-04 1.63E-05	4.44E-05 4.81E-06	1.63E-04 8.51E-06	1.37E-05 3.66E-06	2.74E-04 8.88E-06	8.14E-05 7.40E-06	7.40E-05 1.07E-05	5.18E-05 1.92E-05	1.55E-02 9.62E-05
La-142	4.44E-05	9.62E-05	8.14E-05	4.44E-05	2.18E-05	5.92E-05	8.88E-06	4.81E-05	3.37E-05	7.40E-05	2.78E-05	5.55E-04
La-143	1.04E-06	2.59E-06	1.37E-06	1.70E-06	6.29E-07	1.07E-06	5.55E-07	1.11E-06	8.14E-07	1.44E-06	9.99E-07	1.22E-04
Ce-143 Pr-143	6.29E-05 5.55E-08	2.96E-04 5.55E-08	6.29E-05 5.55E-08	7.77E-05 8.51E-06	2.33E-05 5.55E-08	5.18E-05 5.55E-08	2.33E-05 5.55E-08	6.29E-05 5.55E-08	3.07E-05 5.55E-08	1.33E-04 5.55E-08	8.51E-05 2.96E-07	4.07E-03 1.04E-02
Ce-144	5.55E-04	3.48E-04	7.77E-04	4.44E-03	4.07E-04	7.77E-04	2.59E-04	1.15E-03	5.18E-04	3.03E-04	2.85E-04	1.96E-01
Pr-144	1.04E-07	8.51E-08	2.48E-07	8.88E-08	5.18E-08	1.67E-07	9.62E-09	1.37E-07	9.62E-08	7.40E-08	2.89E-08	1.11E-04
Pr-144m Ce-145	0.00E+00 0.00E+00											
Pr-145	8.51E-07	3.11E-06	1.11E-06	1.07E-06	4.07E-07	8.14E-07	2.44E-07	8.14E-07	5.18E-07	1.81E-06	9.25E-07	9.62E-04
Ce-146	0.00E+00											
Pr-146 Ce-147	0.00E+00 0.00E+00											
Pr-147	2.52E-06	1.85E-06	5.92E-06	2.07E-06	1.11E-06	4.07E-06	1.22E-07	3.18E-06	2.22E-06	1.48E-06	5.18E-07	1.11E-04
Nd-147 Pm-147	8.88E-05 1.59E-07	2.70E-04 1.07E-07	1.22E-04 2.15E-07	1.30E-04 1.44E-03	3.55E-05 1.22E-07	1.18E-04 2.00E-07	2.18E-05 9.62E-08	1.92E-04 2.78E-07	6.29E-05 1.44E-07	1.15E-04 1.04E-07	7.77E-05 9.99E-07	9.99E-03 1.81E-02
Pri-147 Pr-148	0.00E+00											
Pm-148	2.11E-04	7.40E-04	2.48E-04	2.78E-04	9.99E-05	2.33E-04	7.40E-05	3.63E-04	1.41E-04	3.40E-04	2.33E-04	9.62E-03
Pm-148m	2.85E-03	3.59E-03	4.81E-03	3.70E-03	1.44E-03	4.44E-03	3.70E-04	7.77E-03	2.59E-03	1.67E-03	1.15E-03	2.18E-02

Table A-2. Inhalation dose conversion factors based on ICRP-72.

Nuclide	Adrenals	B Surface	Brain	Breast	SWall	SI Wall	ULI Wall	LLI Wall	Kidneys	Liver	ET Region	Lung
Pm-149	2.92E-06	4.81E-06	1.04E-06	2.66E-06	6.29E-04	1.48E-03	7.77E-03	1.70E-02	2.41E-06	9.62E-06	8.51E-03	1.74E-02
Pm-151	5.18E-05	6.66E-05	2.44E-05	4.44E-05	6.29E-04	1.44E-03	5.92E-03	1.04E-02	5.55E-05	5.92E-05	1.33E-02	1.04E-02
Sm-151	1.81E-06	4.07E-01	7.77E-07	6.29E-07	3.55E-05	8.88E-05	5.55E-04	1.67E-03	9.62E-07	1.07E-01	4.07E-03	1.15E-02
Eu-152	1.78E-01	7.03E-01	3.37E-02	4.81E-02	6.29E-02	6.66E-02	8.51E-02	5.55E-02	1.18E-01	9.99E-01	7.77E-02	2.29E-01
Sm-153	2.04E-05	2.81E-04	7.03E-06	1.67E-05	4.81E-04	1.15E-03	5.55E-03	1.15E-02	1.63E-05	3.11E-04	1.04E-02	1.63E-02
Eu-154	1.55E-01	1.52E+00	2.96E-02	4.44E-02	5.55E-02	5.92E-02	7.77E-02	6.29E-02	1.07E-01	1.26E+00	1.04E-01	3.70E-01
Eu-155	7.03E-03	4.44E-01	1.04E-03	1.55E-03	2.37E-03 1.89E-03	2.55E-03	4.44E-03	6.66E-03	5.18E-03	1.37E-01	2.15E-02	7.03E-02
Eu-156 Tb-160	1.81E-03 6.29E-03	5.18E-03 5.18E-02	3.22E-04 1.11E-03	1.52E-03 4.44E-03	3.22E-03	3.59E-03 4.07E-03	1.33E-02 1.04E-02	3.37E-02 2.48E-02	2.63E-03 5.18E-03	7.03E-03 2.00E-02	4.44E-02 5.92E-02	8.51E-02 1.74E-01
Ho-166m	5.55E-01	2.66E+00	8.88E-02	1.18E-01	2.74E-01	1.89E-01	2.33E-01	1.37E-01	3.48E-01	2.26E+00	1.52E-01	4.44E-01
Be-7	1.96E-04	8.51E-05	1.55E-05	2.00E-04	1.07E-04	8.51E-05	1.26E-04	2.07E-04	6.66E-05	1.63E-04	1.52E-03	9.25E-04
Na-24	6.29E-04	1.11E-03	6.29E-04	4.81E-04	1.15E-03	5.92E-04	5.92E-04	6.29E-04	5.55E-04	5.55E-04	4.81E-02	7.03E-04
Mn-54	5.92E-03	4.07E-03	9.99E-04	5.18E-03	3.26E-03	2.48E-03	3.26E-03	4.44E-03	2.81E-03	7.40E-03	2.63E-02	2.33E-02
Fe-55	3.70E-04	2.66E-03	3.70E-04	3.70E-04	3.70E-04	4.07E-04	5.18E-04	7.77E-04	3.70E-04	3.15E-03	3.70E-04	1.48E-03
Fe-59	5.18E-03	4.07E-03	1.70E-03	4.07E-03	3.70E-03	4.07E-03	7.03E-03	1.33E-02	3.55E-03	1.11E-02	4.81E-02	8.88E-02
Co-57	1.81E-03	1.37E-03	7.77E-05	1.78E-03	9.99E-04	4.07E-04	1.04E-03	2.44E-03	5.55E-04	1.59E-03	7.03E-03	2.44E-02
Co-58	4.44E-03	1.92E-03	3.70E-04	4.81E-03	2.63E-03	1.85E-03	3.44E-03	6.66E-03	1.67E-03	3.70E-03	3.37E-02	4.81E-02
Co-60	8.14E-02	3.44E-02	7.77E-03	9.25E-02	4.44E-02	1.30E-02	1.70E-02	2.11E-02	3.15E-02	7.40E-02	2.70E-01	6.66E-01
Cu-64	3.18E-05	3.15E-05	6.66E-05	2.59E-05	2.59E-04	3.00E-04	8.88E-04	1.11E-03	3.11E-05	5.92E-05	5.55E-03	2.74E-03
Cu-67	1.22E-04	1.41E-04	4.44E-04	1.04E-04	4.07E-04	4.81E-04	1.96E-03	4.44E-03	1.11E-04	3.59E-04	1.11E-02	1.89E-02
W-181	3.70E-05	2.44E-04	2.04E-05	7.77E-06	4.07E-05	9.62E-05	3.52E-04	8.88E-04	3.07E-04	8.14E-05	1.59E-03	2.11E-05
W-185	1.18E-05	6.29E-04	1.18E-05	1.18E-05	1.15E-04	1.92E-04	2.48E-03	7.03E-03	1.74E-03	3.07E-04	6.29E-03	1.07E-04
W-187	6.66E-05	2.74E-04	6.66E-05	4.44E-05	3.70E-04	7.03E-04	4.07E-03	7.03E-03	2.85E-04	1.07E-04	1.44E-02	1.89E-04
W-188	5.92E-05	4.07E-03	4.44E-05	3.66E-05	1.63E-04	3.70E-04	9.62E-03	4.07E-02	1.15E-02	2.00E-03	9.99E-03	1.30E-04
Au-198	1.48E-04	1.22E-04	6.66E-05	1.33E-04	7.77E-04	1.67E-03	7.03E-03	1.59E-02	1.18E-04	1.44E-04	1.85E-02	2.15E-02
Au-199	4.07E-05	5.18E-05	1.96E-05	3.63E-05	3.03E-04	6.66E-04	3.07E-03	7.40E-03	3.29E-05	4.07E-05	1.18E-02	2.44E-02
Pb-203	1.89E-04	5.18E-04	1.07E-04	8.14E-05	2.07E-04	3.55E-04	8.14E-04	1.44E-03	7.77E-04	4.81E-04	1.04E-02	1.59E-04
Th-229	6.29E+00	1.89E+03	6.29E+00 1.11E+00	6.29E+00 1.11E+00	6.29E+00	6.29E+00	6.29E+00	6.66E+00	2.66E+01	9.25E+01	1.48E+03	1.85E+03
Th-230 Th-234	1.11E+00 5.55E-05	1.04E+03 2.89E-04	8.14E-06	5.92E-05	1.11E+00 1.59E-03	1.11E+00 4.07E-03	1.15E+00 2.33E-02	1.18E+00 6.66E-02	1.63E+01 1.11E-04	1.37E+01 7.77E-05	2.63E+02 2.29E-02	2.85E+02 2.11E-01
U-233	5.18E-01	1.59E+01	5.18E-01	5.18E-01	5.18E-01	5.18E-01	5.18E-01	5.55E-01	5.18E+00	2.07E+00	4.44E+01	1.04E+02
U-234	5.18E-01	1.44E+01	5.18E-01	5.18E-01	5.18E-01	5.18E-01	5.18E-01	5.55E-01	5.18E+00	1.96E+00	4.44E+01	9.99E+01
U-235	4.81E-01	1.37E+01	4.81E-01	4.81E-01	4.81E-01	4.81E-01	4.81E-01	5.18E-01	4.81E+00	1.81E+00	4.07E+01	8.88E+01
U-237	1.04E-04	7.40E-04	2.15E-05	8.88E-05	4.07E-04	9.99E-04	4.81E-03	1.26E-02	9.99E-04	1.07E-04	2.07E-02	5.18E-02
U-238	4.44E-01	1.30E+01	4.44E-01	4.44E-01	4.44E-01	4.44E-01	4.81E-01	4.81E-01	4.81E+00	1.78E+00	3.70E+01	8.14E+01
U-240	3.52E-05	1.37E-04	2.18E-05	2.63E-05	1.30E-03	2.78E-03	9.99E-03	1.30E-02	4.81E-04	4.44E-05	1.55E-02	1.04E-02
Np-237	4.81E+00	3.70E+03	4.81E+00	4.81E+00	4.81E+00	4.81E+00	4.81E+00	5.18E+00	1.37E+01	5.92E+01	4.81E+01	1.07E+02
Np-239	5.92E-05	2.00E-03	2.55E-05	4.81E-05	5.18E-04	1.22E-03	5.55E-03	1.22E-02	1.15E-04	1.37E-04	1.96E-02	2.63E-02
Np-240	1.63E-05	8.88E-05	1.15E-05	1.07E-05	5.55E-04	3.63E-04	2.74E-04	6.29E-05	1.74E-05	1.55E-05	8.88E-03	1.67E-03
Pu-238	8.88E+00	5.18E+03	8.88E+00	8.88E+00	8.88E+00	8.88E+00	8.88E+00	8.88E+00	2.22E+01	1.07E+03	5.55E+01	1.37E+02
Pu-239	9.99E+00	5.55E+03	9.99E+00	9.99E+00	9.99E+00	9.99E+00	9.99E+00	9.99E+00	2.37E+01	1.22E+03	5.55E+01	1.22E+02
Pu-240	9.99E+00	5.55E+03	9.99E+00	9.99E+00	9.99E+00	9.99E+00	9.99E+00	9.99E+00	2.37E+01	1.22E+03	5.55E+01	1.22E+02
Pu-241	2.07E-01	1.15E+02	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	3.55E-01	2.41E+01	2.26E-01	2.44E-01
Am-241	1.07E+01	6.29E+03	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.07E+01	3.22E+01	3.70E+02	5.55E+01	1.37E+02
Cm-242	1.30E-01	9.99E+01	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.52E-01	2.11E-01	2.04E+00	2.63E+01	3.22E+01	1.33E+02
Nivalida	Mussele	Overien	Danasaaa	D Massau	Claim	Culean	T	Thurson	Thursday	Literan	DIA WAI	F# Daga
Nuclide	Muscle	Ovaries	Pancreas	R Marrow	Skin	Spleen	Testes	Thymus	Thyroid	Uterus	Bld Wall	Eff Dose
Pm-149 Pm-151	2.85E-06 6.29E-05	1.26E-05 2.92E-04	3.11E-06 6.66E-05	5.55E-06	1.15E-06	2.66E-06	1.18E-06 2.44E-05	3.48E-06 6.29E-05	1.63E-06 3.26E-05	5.92E-06 1.41E-04	4.07E-06 8.88E-05	3.44E-03
FIII-131			0.00E-03	7.77E-05	2.41E-05	5.55E-05	2.446-00	0.296-03	3.200-03		0.000-00	2.55E-03
Sm-151			1 04E-06	3 22E-02	6 66E-07	5 02E-07	5 18E-07	6 20E-07	5.55E-07		1.55E-05	1 48E-02
Sm-151 Fu-152	8.88E-07	6.29E-07	1.04E-06 1.33E-01	3.22E-02 2.59E-01	6.66E-07	5.92E-07 4.81E-02	5.18E-07	6.29E-07 4.81E-02	5.55E-07	5.18E-07	1.55E-05 2.44E-02	1.48E-02
Eu-152	8.88E-07 5.18E-02	6.29E-07 5.18E-02	1.33E-01	2.59E-01	3.26E-02	4.81E-02	1.37E-02	4.81E-02	3.07E-02	5.18E-07 3.70E-02	2.44E-02	1.55E-01
Eu-152 Sm-153	8.88E-07 5.18E-02 2.15E-05	6.29E-07 5.18E-02 1.04E-04	1.33E-01 2.29E-05	2.59E-01 1.07E-04	3.26E-02 7.77E-06	4.81E-02 1.78E-05	1.37E-02 7.77E-06	4.81E-02 2.18E-05	3.07E-02 9.62E-06	5.18E-07 3.70E-02 4.44E-05	2.44E-02 3.52E-05	1.55E-01 2.96E-03
Eu-152 Sm-153 Eu-154	8.88E-07 5.18E-02 2.15E-05 4.44E-02	6.29E-07 5.18E-02 1.04E-04 4.44E-02	1.33E-01 2.29E-05 1.15E-01	2.59E-01 1.07E-04 3.37E-01	3.26E-02 7.77E-06 2.89E-02	4.81E-02 1.78E-05 4.44E-02	1.37E-02 7.77E-06 1.22E-02	4.81E-02 2.18E-05 4.44E-02	3.07E-02 9.62E-06 2.78E-02	5.18E-07 3.70E-02 4.44E-05 3.37E-02	2.44E-02 3.52E-05 2.18E-02	1.55E-01 2.96E-03 1.96E-01
Eu-152 Sm-153	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02	3.26E-02 7.77E-06 2.89E-02 8.51E-04	4.81E-02 1.78E-05 4.44E-02 1.70E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03	2.44E-02 3.52E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02
Eu-152 Sm-153 Eu-154 Eu-155	8.88E-07 5.18E-02 2.15E-05 4.44E-02	6.29E-07 5.18E-02 1.04E-04 4.44E-02	1.33E-01 2.29E-05 1.15E-01	2.59E-01 1.07E-04 3.37E-01	3.26E-02 7.77E-06 2.89E-02	4.81E-02 1.78E-05 4.44E-02	1.37E-02 7.77E-06 1.22E-02	4.81E-02 2.18E-05 4.44E-02	3.07E-02 9.62E-06 2.78E-02	5.18E-07 3.70E-02 4.44E-05 3.37E-02	2.44E-02 3.52E-05 2.18E-02 7.40E-04	1.55E-01 2.96E-03 1.96E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.11E-02	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 4.44E-05 5.92E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-04 1.48E-03 3.70E-04 1.89E-03	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 1.81E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-03 2.85E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 1.37E-03	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Th-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.29E-04 2.44E-03 3.70E-04 3.70E-04 3.85E-04 1.81E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 4.44E-03 3.70E-04 4.44E-03 3.77E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.16E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-05 4.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 3.29E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 2.64E-03	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-03 2.85E-04 1.81E-03 8.51E-03	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 3.37E-03 5.92E-02	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-03 6.29E-02	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.55E-03 1.04E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 2.66E-03 7.03E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.75E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 2.85E-04 1.81E-03 8.51E-03 7.03E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 3.37E-03 3.37E-03 6.66E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 4.07E-03 4.81E-03 4.81E-03 4.81E-03 4.84E-04 2.59E-03 4.44E-02 3.66E-05	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-03 3.29E-02 3.22E-05	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.47E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.55E-03 1.48E-03 1.52E-02 3.70E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 3.77E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 4.44E-03 1.37E-03 1.37E-03 5.92E-02 6.66E-05 3.70E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 3.70E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.48E-03 1.52E-02 3.70E-03 7.77E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-60 Cu-64 Cu-64 V-181	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 3.37E-05 1.11E-04 2.55E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-03 2.85E-04 1.81E-03 7.03E-05 1.70E-04 9.25E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.77E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 8.44E-02 3.66E-05 1.18E-04 7.77E-05	3.26E-02 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 8.51E-04 8.51E-04 5.92E-03 4.44E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 3.70E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 1.15E-01 6.29E-04
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 3.63E-02 3.37E-05 1.11E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 8.51E-03 8.51E-03 7.03E-05 1.70E-04 9.25E-05 1.70E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 3.37E-03 3.37E-03 3.70E-04 4.45E-05 3.70E-04 1.70E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 4.07E-03 4.81E-03 4.81E-03 4.81E-03 4.84E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.15E-05 8.88E-05 1.11E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.11E-02 7.40E-03 3.29E-03 3.29E-03 3.22E-05 1.15E-04 2.70E-04 1.48E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 7.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 3.63E-02 2.96E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.55E-04 5.92E-03 4.44E-05 1.33E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 3.70E-04 3.70E-04 3.70E-04 3.70E-04 3.70E-05 3.37E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 4.44E-01 0.00E+00 2.15E-04 1.89E-03 1.55E-03 1.48E-03 1.52E-02 3.70E-03 7.77E-03 1.15E-01 4.270E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-60 Cu-64 Cu-64 V-181	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.62E-03 7.40E-04 2.04E-03 3.63E-02 3.77E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-03 2.85E-04 1.81E-03 7.03E-05 1.70E-04 9.25E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.77E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-04 5.18E-05 8.51E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 1.18E-05 5.55E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 7.40E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 8.51E-04 8.51E-04 5.92E-03 4.44E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 3.70E-03	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 1.15E-01 6.29E-04
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.37E-05 1.11E-04 2.55E-05 9.25E-05 4.81E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-04 1.81E-03 7.03E-05 1.70E-04 9.25E-05 1.22E-05 1.22E-05 1.22E-05 2.96E-04 8.88E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.18E-05 8.51E-05 5.92E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04	3.26E-02 2.77Fe-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 1.18E-05 5.55E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.31E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 1.18E-05 6.29E-05 4.07E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.18E-05 4.07E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 4.44E-05 1.33E-04 4.44E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 3.70E-03 3.37E-05 1.33E-04 8.14E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 1.15E-01 6.29E-04 2.70E-03 1.59E-04
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-64 V-181 W-185 W-185 W-187 W-188	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.62E-03 7.40E-04 2.04E-03 3.63E-02 3.77E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-03 3.70E-03 8.51E-03 7.03E-05 1.70E-04 9.25E-05 1.22E-05 2.96E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.77E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-04 5.18E-05 8.51E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 1.18E-05 5.55E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 7.40E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 5.92E-03 4.44E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E+05 7.40E-04 1.15E-03 3.70E-04 5.92E-04 3.70E-04 5.92E-04 3.77E-05 1.33E-04 8.14E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.45E-03 1.45E-03 1.15E-01 6.29E-04 2.70E-03 1.59E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-185 W-185 W-187 W-188	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.96E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 1.11E-04 2.55E-05 1.11E-04 2.55E-05 1.8E-05 9.25E-05 4.81E-05 1.37E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-03 3.70E-03 3.51E-03 7.03E-05 1.70E-04 4.81E-03 8.51E-03 8.51E-03 4.24E-05 4.25E-05 1.70E-04 8.88E-05 4.81E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 3.37E-03 3.37E-03 3.70E-04 1.37E-05 8.51E-05 8.51E-05 5.92E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.20E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 7.03E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-03	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 1.18E-05 6.29E-05	4.81E-02 4.44E-02 1.85E-03 1.74E-03 1.74E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 4.07E-05 4.07E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 4.44E-05 7.03E-04 2.44E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.18E-05 7.03E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 5.92E-03 4.44E-05 1.33E-04 4.44E-05 1.38E-05 1.18E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 2.29E-03 3.70E-04 2.29E-03 3.37E-04 3.70E-04 3.37E-05 4.07E-04 8.14E-05 4.07E-04 8.88E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 1.89E-03 5.55E-03 1.48E-03 1.52E-02 3.70E-03 1.15E-01 6.29E-04 2.70E-03 1.59E-04 4.70E-03 1.59E-04
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 3.37E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 4.81E-05 1.37E-04 3.70E-04	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-03 3.70E-03 3.85E-04 1.81E-03 8.51E-03 8.51E-03 6.70E-04 9.25E-05 1.70E-04 8.88E-05 4.81E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-04 3.70E-05 5.92E-02 6.68E-05 5.92E-05 1.18E-05 1.52E-04 4.44E-05 1.52E-04 4.44E-05 1.52E-04 6.52E-04 6.52E-04 6.52E-04 6.52E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-02 2.37E-04 9.25E+01	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 2.00E-05 5.00E-05 6.29E+00	4.81E-02 1.78E-05 4.44E-02 1.70E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.30E-03 3.29E-02 3.29E-02 3.29E-02 3.22E-05 1.15E-04 2.70E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.92E+00	1.37E-02 1.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 1.70E-03 1.70E-03 1.70E-03 1.70E-03 1.70E-05 1.70E-	4.81E-02 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 7.40E-05 4.07E-05 4.07E-06 4.81E-05 1.26E-04 4.81E-05 7.40E-05 4.62E-04 4.81E-05 1.26E-04	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 4.44E-03 3.70E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.18E-05 7.03E-04 1.44E-05 1.70E-04 1.44E-05 1.70E-04 1.47E-05 1.70E-05 9.62E-05 9.62E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 5.92E-03 4.44E-05 1.33E-04 4.44E-05 1.18E-05 1.18E-05 1.18E-05 1.67E-04 5.92E-05 1.67E-04 5.92E-05 1.67E-04 5.92E-05 1.67E-04 5.92E-05 1.67E-04 5.92E-05 1.67E-04 5.92E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.29E-03 3.70E-04 5.29E-04 3.70E-03 3.37E-05 4.07E-04 8.14E-05 4.88E-04 1.18E-03 2.85E-04 1.04E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.45E-02 3.70E-03 1.15E-01 6.29E-04 8.14E-04 1.18E-03 3.11E-03 3.11E-03 3.11E-03 3.11E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-230	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 3.77E-05 1.11E-04 2.55E-05 4.81E-05 9.25E-05 4.81E-05 1.37E-04 3.70E-04 1.37E-04 1.33E-04 1.33E-04 1.33E-04 1.33E-04 1.32E-00 1.11E-00 1.11E-00 1.11E-00	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.20E-04 9.25E-05 2.96E-04 8.88E-05 4.81E-04 1.26E-04 2.70E-04 9.25E-05 1.20E-04 8.88E-05 4.81E-04 1.26E-04 2.70E-04 1.26E-04 2.70E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.48E+01 8.51E+00	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 1.18E-05 6.52E-04 4.44E-05 1.20E-05 1.20E-05 1.20E-06	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 4.44E-05 2.37E-04 9.25E+01 3.70E-04	3.26E-02 2.77FE-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 4.07E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.37E-05 1.44E-04 5.92E+00 1.11E+00	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 9.25E-05 1.03E-05 9.25E-05 1.03E-05 9.25E-05 1.03E-05 9.25E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.18E-05 7.40E-05 4.07E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.26E-04 1.11E+00	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 2.44E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 3.63E-02 2.96E-05 1.18E-05 9.62E-05 9.62E-05 1.18E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 8.51E-04 8.51E-04 5.92E-03 4.44E-05 1.38E-05 1.38E-04 6.66E-05 1.89E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.29E-03 3.70E-04 5.29E-03 3.70E-04 5.29E-04 1.40E-05 1.33E-04 8.14E-05 4.07E-04 1.8E-03 2.85E-04 1.18E-03 2.85E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 7.77E-03 7.77E-03 1.52E-04 2.70E-03 1.59E-04 8.14E-04 1.18E-03 3.11E-03 4.07E-03 3.52E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-64 V-181 W-185 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-229 Th-230 Th-234	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 3.70E-04 2.92E-03 3.37E-05 1.11E-04 2.55E-05 1.37E-04 3.70E-04 3.70E-04 3.70E-05 1.37E-06 1.37E-06 1.37E-06 1.33E-04 6.29E+00 3.03E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 4.24E-05 4.81E-03 4.24E-05 4.81E-04 2.26E-04 1.26E-04 1.26E-04 1.26E-04 1.51E+00 5.92E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.18E-05 5.92E-05 1.52E-04 4.44E-05 1.81E-04 6.29E+00 1.11E-04	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 1.37E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04 1.31E-04	3.26E-02 2.77E-06 2.89E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-05 4.44E-04 1.89E-03 3.20E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 1.18E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00 1.52E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 4.07E-03 1.31E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.92E+00 1.11E+00 4.44E-04	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 1.18E-05 2.07E-05 9.25E-05 1.07E-05 9.25E-05 1.48E+01 8.51E+00 1.63E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 7.70E-04 7.70E-04 7.70E-04 7.70E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 7.03E-05 1.07E-04 1.44E-05 1.18E-05 7.03E-05 1.07E-04 1.44E-05 1.18E-05 7.03E-05 1.07E-05 9.62E-05 2.66E-05 1.18E-04	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.87E-04 5.92E-03 2.81E-03 5.92E-04 6.66E-05 1.87E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 8.14E-05 4.07E-04 8.88E-04 1.18E-03 2.88E-04 1.04E-04 0.00E+00	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.49E-03 3.70E-03 7.77E-03 1.59E-04 2.70E-03 3.11E-04 1.18E-04 1.18E-03 3.11E-03 4.07E-03 3.52E-04 0.00E+00
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-230 Th-234 U-233	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 1.11E-04 2.55E-05 1.18E-05 4.81E-05 4.81E-05 4.81E-05 1.37E-04 3.70E-04 3.70E-05 1.37E-04 3.70E-05 1.33E-04 3.70E-05 1.31E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-04 3.70E-03 8.51E-03 8.51E-03 8.51E-04 9.25E-05 1.20E-04 9.25E-05 4.81E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.48E+01 8.51E+00 5.92E-05 5.18E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 4.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.18E-05 5.92E-02 4.44E-03 1.48E-05 6.8E-05 1.18E-05 5.92E-04 4.44E-05 1.8E-04 6.29E+00 1.11E+00 4.44E-05 5.18E-01	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 1.70E-04 1.70E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 8.14E-05 6.29E+00 1.52E-05 5.18E-05 8.20E-00 1.52E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 3.29E-03 3.29E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 9.99E-03 1.11E+00 4.44E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 7.03E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-05 9.25E-05 1.18E-01 8.51E+00 1.63E-05 5.18E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 4.07E-05 4.07E-05 4.07E-05 1.70E-04 4.81E-05 7.40E-05 4.07E-05 1.26E-04 6.29E+00 7.03E-04 5.85E-04 6.29E+00 7.03E-05 5.88E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.18E-05 1.18E-05 9.62E-05 9.62E-05 9.66E-05 1.18E-04 0.00E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 5.92E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.18E-05 1.18E-05 1.67E-04 5.92E-05 2.44E-04 0.00E+00 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.92E-04 3.70E-04 5.92E-04 3.70E-04 1.37E-05 4.07E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.74E-04 0.00E+00	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 7.77E-03 1.52E-02 3.70E-03 1.52E-04 8.14E-04 8.14E-04 0.00E+00 0.00E+00
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 1.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.62E-03 3.70E-04 2.92E-03 3.63E-02 3.77E-05 1.11E-04 2.55E-05 4.81E-05 1.37E-04 3.70E-04 3.70E-05 1.37E-04 3.70E-05 1.33E-04 6.29E+00 1.11E+00 3.03E-05 5.18E-01 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 2.44E-03 3.70E-03 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.20E-04 9.25E-05 2.96E-04 8.88E-05 4.81E-04 1.26E-04 2.70E-04 9.25E-05 5.96E-04 8.88E-05 5.96E-04 1.26E-04 2.70E-04 1.26E-04 2.70E-04 1.26E-05 5.96E-04 1.26E-04 5.92E-05 5.98E-05	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 3.77E-03 5.92E-02 6.66E-05 1.18E-05 1.52E-04 4.44E-05 1.81E-05 1.81E-04 6.29E+00 1.11E+00 4.44E-05 1.81E-04 5.18E-01	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 8.44E-02 3.66E-05 2.22E-04 1.33E-04 1.33E-04 1.41E-03 1.70E-04 9.25E+01 3.70E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.37E-04 1.55E+00 1.48E+00	3.26E-02 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 5.18E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00 1.52E-05 5.18E-01 5.18E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 4.07E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01 5.18E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 7.03E-05 9.25E-05 1.48E+01 8.51E+00 1.51E+00 1.51E+00 1.51E-01 5.18E-01 5.18E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.18E-05 7.40E-05 4.07E-05 1.70E-04 4.81E-05 1.70E-04 6.29E+00 1.11E+00 7.03E-05 5.18E-01 5.18E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 7.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 3.63E-02 2.96E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 9.62E-05 1.18E-04 0.00E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 8.51E-04 8.51E-04 5.92E-03 4.44E-05 1.38E-03 1.67E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.5E-03 3.70E-04 5.29E-03 3.70E-04 5.29E-03 3.77E-04 5.29E-04 1.40E-05 4.07E-04 8.88E-04 1.18E-05 4.07E-04 8.88E-04 1.18E-03 2.85E-04	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 7.77E-03 1.52E-04 4.14E-04 4.18E-03 3.11E-03 4.07E-03 3.55E-04 0.00E+00 0.00E+00
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-185 W-187 W-188 Au-198 Au-199 Pb-203 Th-229 Th-230 Th-229 Th-231 U-233 U-234 U-235	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.37E-05 1.11E-04 3.73E-05 1.37E-04 3.70E-04 3.70E-04 3.70E-05 1.11E-05 9.25E-05 1.37E-04 3.70E-05 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-03 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 4.81E-01 8.51E-04 1.26E-04 1.26E-04 1.26E-04 1.48E+01 8.51E+00 5.18E-01 4.81E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 4.44E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.18E-05 5.92E-05 1.81E-04 6.29E+00 1.11E+00 4.44E-05 5.18E-01 5.18E-01 6.18E-01	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 1.33E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 9.25E+01 1.70E-04 1.55E+00 1.48E+00 1.41E+00	3.26E-02 8.51E-04 4.81E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-05 4.44E-04 1.48E-03 3.20E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 6.09E-05 7.03E-05 6.29E+00 1.11E+00 1.15E-01 5.18E-01 5.18E-01 5.18E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 2.70E-04 2.70E-04 3.70E-05 1.33E-04 3.70E-05 1.44E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01 4.81E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 1.18E-05 2.07E-05 9.25E-05 1.48E+01 8.51E+00 1.63E-05 5.18E-01 5.18E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 5.88E-01 4.81E-01 5.88E-01 4.81E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 3.44E-05 7.03E-04 2.44E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 3.63E-02 2.96E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.52E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 6.66E-05 1.89E-04 5.92E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 5.92E-04 8.14E-05 4.07E-04 8.88E-04 1.18E-03 2.85E-04 1.04E-04 0.00E+00 0.00E+00 0.00E+00	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.49E-03 3.70E-03 7.77E-03 1.59E-04 2.70E-03 3.11E-03 4.14E-04 1.18E-03 3.11E-03 4.07E-03 3.55E-04 0.00E+00 0.00E+00 0.00E+00
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-66 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-233 U-234 U-233 U-234 U-235	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 1.11E-04 2.55E-05 1.11E-04 2.55E-05 1.37E-04 3.70E-06 1.33E-04 3.70E-05 1.31E-05 1.37E-04 3.70E-05 1.33E-04 3.70E-05 1.33E-04 3.70E-05 1.33E-04 3.70E-05 1.33E-04 3.70E-05 1.33E-04 3.70E-05 1.33E-04 3.70E-05 1.38E-01 5.18E-01 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 5.92E-04 2.44E-03 3.70E-04 3.70E-04 3.70E-04 9.25E-05 1.70E-04 9.25E-05 1.20E-04 9.25E-05 1.20E-04 9.25E-05 5.96E-04 8.88E-05 4.81E-04 1.26E-04 1.26E-04 1.26E-04 1.48E+01 8.51E+00 5.92E-05 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.44E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 1.18E-05 6.92E-04 4.44E-05 1.18E-05 6.29E-04 4.44E-05 1.18E-05 1.18E-01 6.29E+00 1.11E+00 6.29E+00 1.11E+00 6.29E+00 1.11E+00 6.29E+00 6.2	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 1.70E-04 1.55E+00 1.48E+00 1.48E+00 1.48E+00 1.41E+00 1.59E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 6.29E+00 1.11E+00 5.25E-05 8.14E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 9.99E-03 1.11E+00 5.18E-01 5.18E-01 5.18E-01 8.14E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 9.25E-05 1.20E-05 9.25E-05 1.3E-01 8.51E+00 1.63E-05 9.25E-05 9.25E-05 1.48E-01 8.51E+00 1.63E-05 1.48E-01 8.51E+00 1.63E-05 1.88E-01 8.51E-01 8.51E-01 8.51E-01 8.51E-01 8.51E-01 8.51E-01 8.51E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.26E-04 4.81E-05 1.70E-04 4.81E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.20E-04 1.41E-05 1.41E-05 1.41E-05 1.41E-05 1.41E-05 1.41E-05 1.41E-05 1.41E-05 1.41E-01 1.41E-01 1.41E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.18E-05 9.62E-05 9.62E-05 1.18E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 5.92E-03 4.44E-05 1.18E-05 1.18E-05 1.18E-05 1.87E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 3.70E-04 3.70E-04 3.70E-04 3.70E-04 4.70E-04 8.14E-05 4.07E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.74E-04 0.00E+00 0.00E+00 6.29E+00 1.11E+00	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.45E-02 3.70E-03 7.77E-03 1.15E-01 6.29E-04 8.14E-04 1.18E-03 3.11E-03 4.07E-03 5.55E-04 8.14E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.06E+00 2.63E+02 5.88E+01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-67 Co-68 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.92E-03 3.70E-04 2.92E-03 3.74E-05 1.11E-04 2.55E-05 1.37E-04 6.29E+00 1.37E-04 6.29E+00 1.37E-05 1.33E-04 6.29E+00 1.11E+00 1.33E-04 6.29E+00 1.11E+00 1.33E-04 6.29E+00 1.11E+00 1.33E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 1.81E-03 4.88E-05 4.81E-04 1.26E-04 2.70E-04 1.48E+01 5.18E-01 4.81E-01 4.81E-01 4.81E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 3.37E-03 3.37E-03 3.70E-04 3.70E-05 1.18E-05 5.92E-06 1.52E-04 4.44E-05 1.81E-05 5.18E-01 4.44E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 8.88E-04 2.59E-03 1.70E-04 1.33E-04 1.33E-04 1.33E-04 1.37E-04 1.55E+01 1.70E-04 1.55E+01 1.70E-04 1.55E+00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00 1.41E-00	3.26E-02 2.77E-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 1.18E-05 6.29E+00 1.15E-05 5.18E-01 4.44E-01 1.52E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 5.92E+00 1.11E+00 4.44E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01 4.81E-01 8.14E-01 8.14E-05 4.44E-05	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 7.03E-05 9.25E-05 1.48E+01 8.51E+00 1.63E-05 5.18E-01 4.81E-01 4.81E-01 5.18E-01 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.18E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 6.29E+00 7.03E-05 5.18E-01 4.81E-01 1.18E-01 4.81E-01 1.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 7.03E-04 7.07E-02 0.00E+00 8.14E-05 7.03E-04 2.46E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 1.8E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.03E-05 1.18E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.44E-05 1.33E-04 5.92E-03 4.44E-05 1.33E-04 5.92E-05 2.44E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.24E-05 2.41E-03	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.5E-03 3.70E-04 5.92E-04 3.70E-03 3.77E-04 5.92E-04 8.88E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 1.89E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.52E-02 3.70E-03 7.77E-03 1.52E-04 4.70E-03 3.52E-04 4.18E-03 3.52E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.518E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229 Th-230 Th-234 U-233 U-234 U-235 U-237 U-238 U-240	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.92E-03 3.70E-04 2.92E-03 3.74DE-04 2.04E-03 3.37E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 4.81E-05 1.37E-04 3.70E-05 4.81E-05 1.38E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 4.81E-03 4.52E-05 1.22E-05 2.96E-04 8.88E-05 4.81E-04 1.26E-04 1.26E-04 1.81E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.44E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 4.44E-03 1.37E-03 3.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.81E-05 1.81E-05 1.81E-04 4.44E-05 1.81E-04 4.44E-05 4.44E-05 4.44E-05 4.81E-01 8.51E-05 4.44E-01	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 9.25E+01 3.70E+01 1.70E-04 1.55E+00 1.41E+00 1.41E+00 1.59E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 8.44E-05 6.29E-00 1.11E+00 5.18E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 2.70E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.18E-01 5.18E-01 4.44E-04 5.18E-01 5.18E-01 8.14E-05 4.44E-01 5.18E-01 8.14E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 9.25E-05 1.48E+01 8.51E+00 8.51E+00 1.51E+00 1.51E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 4.07E-05 4.07E-05 1.20E-04 4.81E-03 1.20E-04 1.41E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-01 5.18E-01 5.18E-01 1.18E-04 4.44E-01 4.44E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 4.44E-05 7.03E-04 2.44E-03 3.70E-04 2.46E-03 7.03E-04 1.89E-03 1.62E-05 1.18E-05 1.18E-05 1.18E-00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.02E+00 1.11E+00 2.48E-05 5.18E-01	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.67E-04 5.92E-05 1.18E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.29E+00 1.11E-05 5.18E-05	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 3.70E-03 3.70E-04 3.70E-03 3.77E-04 8.14E-05 4.07E-04 1.18E-03 2.85E-04 1.04E-04 1.74E-04 0.00E+00 0.00E+00 0.00E+00 0.02E+00 1.11E+00 1.11E+00 1.89E-05	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 1.89E-03 5.55E-03 1.48E-03 1.52E-02 3.70E-03 1.15E-01 6.29E-04 8.14E-04 1.18E-03 3.11E-03 3.11E-03 3.55E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.63E+02 5.18E+01 2.92E-02 5.18E+01 2.92E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-66 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-233 U-237 U-238 U-240 Np-237	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.92E-03 1.11E-04 2.55E-05 1.11E-04 2.55E-05 1.37E-04 3.70E-05 1.37E-04 3.70E-05 1.38E-01 5.18E-05 4.81E-05 4.81E-05 4.81E-01 4.44E-01 4.44E-01 4.44E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 2.92E-03 5.92E-04 2.44E-03 3.70E-04 3.70E-04 3.70E-04 9.25E-05 1.70E-04 9.25E-05 1.70E-04 9.25E-05 2.96E-04 8.88E-05 4.81E-04 2.70E-04 1.26E-04 1.26E-04 1.81E-04 1.70E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 1.70E-04 3.70E-04 3.70E-04 3.70E-05 1.18E-05 1.52E-04 4.44E-05 1.81E-04 6.29E+00 1.11E+00 4.44E-05 1.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-05 4.81E-05 4.81E-05 4.81E-05 4.81E-05 4.81E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.37E-04 9.25E-01 1.70E-04 4.44E-05 2.37E-04 1.55E+00 1.48E+00 1.49E-04 1.37E+00 1.59E-04 1.37E+00 1.59E-04 1.37E+00 8.14E-05 1.44E+00 8.14E-05	3.26E-02 2.89E-02 8.51E-04 4.81E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-04 1.48E-03 3.20E-04 1.07E-03 2.04E-02 2.15E-05 1.18E-05 5.55E-05 4.07E-05 8.14E-05 5.20E-05 8.14E-05 5.18E-01 4.44E-01 4.81E-01 2.00E-05 8.14E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.31E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.92E+00 4.44E-05 5.18E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-05 5.18E-01 8.14E-05	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 9.25E-05 1.88E-01 8.51E+00 1.63E-05 5.18E-01 5.18E-01 5.18E-01 1.78E-05 4.44E-01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.23F-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.55E-05 1.26E-04 1.41E-05 1.26E-04 4.81E-05 1.20E-04 1.41E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.20E-04 4.81E-05 1.80E-04 4.81E-01 1.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-04 4.84E-01 4.81E-04 4.84E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.18E-05 9.62E-05 2.66E-05 1.18E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.248E-05 5.18E-01	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 5.92E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.38E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.29E+00 1.11E-00 2.41E-05 5.18E-01 5.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.29E-03 3.77E-04 5.37E-04 5.37E-04 6.13E-04 8.14E-05 4.07E-04 1.88E-04 1.88E-04 1.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 1.88E-01 5.18E-01 5.18E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 0.00E+00 2.15E-04 1.89E-03 1.45E-03 1.45E-03 1.45E-01 6.29E-04 2.70E-03 3.11E-03 4.07E-03 3.11E-03 4.07E-03 5.55E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.33E+01 2.92E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-67 Co-68 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-234 U-233 U-234 U-235 U-237 V-238 U-240 Np-239	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.92E-03 3.63E-02 1.11E-04 2.55E-05 1.37E-04 6.29E+00 1.37E-04 6.29E+00 1.31E-05 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.48E-	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 1.81E-03 7.03E-05 1.22E-05 2.96E-04 4.84E-01 4.84E+01 5.18E-01 1.78E-04 1.48E-01 1.78E-04 1.48E-01 1.78E-04 1.48E+01 1.78E-04 1.48E+01 1.78E-04	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 3.70E-04 3.70E-05 1.18E-05 5.92E-05 1.52E-04 6.29E+00 1.11E+00 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 6.81E-05 4.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-06	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.33E-04 1.37E-01 1.70E-04 1.55E+01 1.70E-04 1.55E+00 1.48E+00 1.41E-00 1.49E+00 1.49E+00 1.49E+00 1.49E+00 1.49E+00 1.49E+00 1.49E+00 1.44E+02 1.44E-05 1.44E+02 1.44E-05	3.26E-02 2.77E-06 2.89E-02 8.51E-04 4.81E-04 4.41E-03 8.51E-02 4.44E-05 4.44E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 1.18E-05 6.29E+00 1.11E+00 1.52E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 6.29E+00 6.29E+00 6.29E+00 6.29E-05 6.81E-05 6.81E-01 6.81E-05 6.81E-01 6.81E-05 6.81E-01 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05 6.81E-05	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-04 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 1.33E-04 5.92E+00 1.44E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01 4.81E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01 8.14E-05 5.48E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 3.59E-02 1.04E-05 4.81E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 6.29E-05 1.11E-05 1.18E-05 6.29E-05 4.07E-05 9.25E-05 1.48E+01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 1.78E-05 5.18E-01 4.44E-01 1.78E-05 5.18E+01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.8E-05 1.740E-05 4.07E-05 5.18E-01 1.11E+00 7.03E-05 5.18E-01 4.81E-01 1.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 6.29E+01 6.29E+01 6.29E+01 6.29E-05 6.81E-01	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 8.14E-05 7.03E-04 2.46E-03 3.70E-04 1.89E-03 1.82E-05 1.07E-05 9.62E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 7.03E-05 1.18E-05 1.18E-05 1.18E-01 1.18E-01 1.18E-01 1.18E-01 1.18E-01	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 5.92E-03 4.44E-05 1.33E-04 5.92E-03 1.35E-04 6.66E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-04 5.92E-05 2.44E-04 6.66E-05 1.8E-05 1.8E-04 5.92E-05 2.44E-04 6.66E-05 1.8E-05 1.8E-04 5.92E-05 2.44E-05 1.8E-05 1.8E-01 5.8E-04 6.9E-04 6.9E-04 6.9E-04 6.9E-04 6.9E-05 6.9E-04 6.9E-04 6.9E-04 6.9E-05 6.9E-04	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.22E-04 3.70E-03 3.77E-04 5.22E-04 3.70E-03 3.77E-04 6.88E-04 1.18E-03 2.85E-04 1.04E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.89E-05 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 3.70E-03 7.77E-03 3.11E-04 4.70E-03 3.55E-04 4.18E-04 1.89E-04 2.70E-03 3.55E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 2.63E+02 5.18E+01 1.39E-02 1.39E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-233 U-234 U-237 U-238 U-240 Np-237 Np-239 Np-240	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.92E-03 3.70E-04 2.92E-03 3.74DE-04 2.92E-03 3.73E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 4.81E-05 6.29E+00 1.11E+00 6.29E+00 1.11E+01 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 3.70E-03 3.70E-04 3.70E-03 4.81E-03 8.51E-03 7.03E-05 1.70E-04 4.88E-05 4.81E-04 1.26E-04 2.70E-04 1.88E-01 5.18E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 6.29E+00 1.11E+00 6.29E+00 1.44E-05 6.44E-05 6.44E-01 6.29E-05 4.81E-05 4.81E-05 4.81E-05 4.81E-05 4.81E-01 5.18E-01 5.18E-01 5.18E-01 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 9.25E+01 3.70E+01 1.70E-04 1.59E-04 0.159E-04 1.37E+00 1.41E+00 1.41E+00 1.59E-04 1.37E+04 1.37E+00 1.41E+00 1.41E+00 1.59E-04 1.37E+04 1.37E+04 1.37E+00 1.41E+05 1.44E+02 1.96E-04 2.09E-04	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 8.14E-05 6.29E+00 1.12E+01 5.18E-01	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 2.70E-04 4.48E-03 3.24E-04 5.92E-02 1.48E-03 4.44E-04 5.92E+00 1.11E+00 4.44E-05 4.44E-01 5.18E-01 8.14E-05 4.44E-05 4.81E-05 4.81E+00 5.18E-05 5.25E-05	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-04 1.70E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 1.11E-05 6.29E-05 1.18E-01 6.38E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 4.44E-01 1.78E-05 5.18E+01 4.44E-05 5.18E+01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23F-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 4.07E-05 4.07E-05 1.26E-04 4.81E-03 1.26E-04 6.29E+00 1.11E+00 7.03E-05 5.18E-01 5.18E-01 5.18E-01 5.18E-01 6.29E-05 4.81E-01 6.29E-05 4.81E-01 6.29E-05 4.81E-01 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 3.70E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.18E-05 1.18E-05 1.18E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E-05 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 4.52E-03 4.44E-05 1.38E-05 1.18E-05 1.67E-04 5.92E-05 1.89E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E-05 5.18E-01 5.18E-01 5.18E-01 5.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 2.29E-03 1.07E-04 3.70E-04 3.70E-04 3.70E-04 3.70E-04 4.70E-03 3.37E-05 4.07E-04 1.18E-03 2.85E-04 1.04E-04 1.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 0.15E-04 1.89E-03 1.5E-02 3.70E-03 1.15E-01 6.29E-04 2.70E-03 1.59E-04 8.14E-04 8.14E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+01 1.39E-02
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-233 U-234 U-235 U-237 U-238 U-240 Np-237 Np-239 Np-240 Pu-238	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.66E-03 3.70E-04 2.92E-03 7.40E-04 2.92E-03 7.40E-04 2.92E-03 1.11E-04 2.55E-05 1.18E-05 9.25E-05 1.37E-04 3.70E-05 1.33E-04 3.70E-05 1.38E-01 5.18E-01 4.81E-01 7.03E-05 4.44E-01 4.44E-01 4.44E-01 4.44E-01 5.55E-05 1.78E-06 5.5E-05	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.09E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 8.51E-03 8.51E-03 8.51E-03 8.51E-03 4.81E-04 4.24E-04 4.270E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.26E-04 1.48E+01 8.51E+00 5.92E-05 5.18E-01 5.18E-01 1.78E-01 1.78E-01 1.78E-04 1.24E-04 4.44E-01 4.44E-01 4.59E-04 5.18E-01 2.44E-04 4.44E-01 1.78E-04 5.18E-01 2.44E-04 4.44E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 1.70E-04 3.70E-04 3.70E-04 3.70E-05 1.18E-05 6.592E-02 6.68E-05 1.52E-04 4.44E-05 1.52E-04 4.44E-05 1.81E-01 6.29E+00 4.44E-05 1.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-01 8.51E-05 8.51E-05 6.92E-00 6.29E+00 6.29E+00 6.29E+00 6.29E+00 6.29E-00 6.	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-04 4.44E-05 2.37E-04 9.25E+01 1.70E-04 4.41E+00 1.55E+00 1.48E+00 1.49E-04 1.37E+00 1.49E-04 1.39E-04 1.39E-04 1.39E-04 1.37E+00 1.49E-05 1.49E-05 1.49E-05 1.49E-05 1.49E-05 1.49E-05 1.49E-05 1.55E-00	3.26E-02 2.89E-02 8.51E-04 4.81E-04 4.81E-04 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 1.18E-05 5.55E-05 4.07E-05 8.88E-05 1.11E+00 1.52E-05 8.14E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 5.81E-01 6.29E+00 1.52E-05 6.29E+00 1.52E-05 6.29E+00 1.52E-05 6.29E+00 6.2	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.31E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.92E+00 4.44E-05 5.18E-01 8.14E-05 4.44E-01 9.70E-04 8.14E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-01 8.14E-05 4.44E-05 5.18E-01 8.14E-05 5.18E-01 8.14E-05 8.1	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.18E-05 6.29E-05 4.07E-05 9.25E-05 1.88E-01 8.51E+00 1.51E+01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.78E-05 4.44E-01 1.78E-05 5.18E-01 1.78E-05 5.18E-01 1.78E-05 5.18E-01 1.78E-05 3.70E-06	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.23TE-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.55E-05 1.22E-04 1.41E-05 1.22E-04 1.41E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-01 1.18E-01 1.18E-01 1.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 6.29E+00 6.	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 7.03E-04 7.07E-03 7.77E-02 0.00E+00 8.14E-05 1.3E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.8E-05 1.8E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05 5.18E-01 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 5.92E-03 4.44E-05 1.18E-05 1.18E-05 1.87E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.41E-05 5.18E-01 5.18E-01 5.18E-01 6.66E-05 5.18E-01 6.66E-05 5.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 1.15E-03 3.70E-04 5.92E-04 5.92E-04 5.92E-04 6.92E-04 6.92E-04 1.46E-04 1.46E-01 1.89E-05 5.18E-01 4.81E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 3.70E-03 7.77E-03 1.15E-01 6.29E-04 2.70E-03 3.11E-03 4.07E-03 3.52E-04 0.00E+00 0.00E+00 0.00E+00 2.58E+01 2.92E-02 1.39E-01 1.99E-02 1.39E-01 1.99E-02 1.39E-01 1.99E-04 1.99E-04 1.99E-04 1.99E-04 1.99E-02 1.39E-01 1.99E-01 1.99E-01 1.99E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229 Th-230 Th-234 U-233 U-234 U-235 U-237 V-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-239	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.96E-03 3.70E-04 2.92E-03 3.70E-04 2.92E-03 3.73E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 1.37E-04 3.70E-04 3.70E-05 1.38E-01 6.29E+00 1.11E+00 3.03E-05 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 1.81E-03 8.51E-03 7.03E-05 1.22E-05 2.96E-04 1.26E-04 1.26E-04 1.27E-04 1.48E+01 1.81E-01 2.44E-04 1.48E-01 1.78E-04 5.18E-01 1.78E-04 5.18E+01 1.78E-04 5.18E-01 1.78E-04 5.18E-01 1.78E-04 5.18E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 3.70E-05 3.70E-05 3.70E-05 1.18E-05 5.92E-05 1.52E-04 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 6.29E-05 3.70E-05 8.81E-01 8.81E-01 8.81E-01 8.81E-05 8.81E-05 8.81E-05 8.88E-01 9.99E-05 3.70E-05 8.88E+00 9.99E+00	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.33E-04 1.37E-01 1.70E-04 1.55E+01 1.70E-04 1.55E+00 1.41E+00 1.59E-04 1.57E+00 1.41E+00 1.59E-04 1.57E+00 1.44E+02 1.44E+02 1.44E+02 1.44E+02 1.44E+02 1.44E+04 1.57E+00 1.44E+04 1.57E+00 1.44E+05 1.44E+05 1.44E+05 1.44E+05 1.44E+05 1.46E-04 2.05E-04 2.0	3.26E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.99E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 6.29E+00 1.11E-05 6.29E+00 1.11E-05 6.29E+00 1.12E-05 5.18E-01 6.29E-05 6.29E-05 8.44E-01 6.88E-05 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 9.99E-05 8.14E-06 8.88E+00 9.99E+00	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 2.70E-04 2.70E-04 2.70E-04 1.48E-03 2.44E-04 5.92E+00 1.11E+00 1.44E-05 5.18E-01 8.14E-05 4.44E-04 5.92E+00 1.11E+00 1.11E-01 8.14E-05 6.81E-01 8.14E-05 8.88E+00 9.99E+00 9.99E+00	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 3.59E-02 1.04E-05 4.81E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 6.29E-05 1.11E-05 1.18E-05 6.29E-05 6.29E-05 1.48E+01 6.3E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 5.18E-01 4.81E-01 6.3E-05 5.18E-01 6.3E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.18E-05 1.740E-05 4.07E-05 1.70E-04 4.81E-05 1.26E-04 6.29E+00 7.03E-05 5.18E-01 1.11E+00 7.03E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 5.88E-01 4.81E-01 6.29E+00 7.03E-05 5.88E-01 6.82E-05 6.88E+00 9.99E+00	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.46E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 1.07E-04 1.44E-05 1.18E-05 7.03E-05 1.07E-05 9.62E-05 1.07E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.84E-01 4.81E-01 4.8	5.18E-07 3.77E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 4.44E-05 1.33E-04 4.44E-05 1.33E-04 4.44E-05 1.87E-04 5.92E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 5.18E-01 1.15E-04 5.92E-05 2.44E-04 5.92E-05 2.44E-05 1.87E-04 5.92E-05 2.44E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00 1.11E+00 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.22E-04 3.70E-04 5.22E-04 3.70E-04 8.88E-04 1.48E-05 4.07E-04 8.88E-04 1.04E-04 1.18E-03 2.85E-04 1.00E+00 0.00E+00 0.00E+00 0.00E+00 1.89E-05 5.18E-01 1.88E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 7.77E-03 7.77E-03 7.77E-03 1.15E-01 6.29E-04 2.70E-03 3.52E-03 3.14E-04 1.89E-04 2.70E-03 3.55E-04 0.00E+00 0.00E+00 0.00E+00 1.63E+02 1.33E+01 1.30E+01 1.30E+01 1.30E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-230 Th-233 U-234 U-233 U-234 U-235 U-237 U-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-239 Pu-240	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.96E-03 3.70E-04 2.92E-03 7.40E-04 2.04E-03 3.63E-02 3.37E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 1.37E-04 3.70E-05 4.81E-05 1.33E-04 6.29E+00 1.11E+00 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 9.95E-05 4.81E-05 9.55E-05 8.88E+00 9.99E+00 9.99E+00	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 3.70E-03 3.70E-03 8.51E-03 7.03E-05 1.70E-04 4.88E-05 4.81E-04 1.26E-04 2.70E-04 1.81E-01 5.18E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 4.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 3.70E-04 3.70E-05 1.18E-05 5.92E-02 4.44E-03 1.11E+00 4.44E-05 5.18E-01 5.18E-01 5.18E-01 6.29E+00 1.11E+00 4.44E-05 5.18E-01 6.29E+00 1.48E-01 6.29E-05 4.44E-05 6.48E-01 6.29E-05 4.48E-01 6.29E-05 6.48E-01 6.29E-05 6.48E-01 6.29E-05 6.48E-01 6.29E-05 6.48E-01 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-05 6.29E-00 6.2	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 4.84E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.41E-03 1.70E-01 1.70E-04 4.44E-05 2.37E-04 1.55E+00 1.48E+00 1.49E-05 1.48E+00 1.59E-04 1.37E+00 2.59E-04 1.37E+00 2.55E+01 2.06E-05 2.74E+02 2.74E+02	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 8.14E-05 6.29E+00 1.52E-05 5.18E-01 5.1	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 5.55E-04 4.07E-03 1.11E-02 7.40E-03 1.30E-03 3.29E-02 3.29E-02 3.29E-02 3.29E-04 2.70E-04 2.70E-04 2.70E-04 3.70E-05 1.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 9.99E-03 1.44E-05 5.18E-01	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 9.25E-05 1.11E-05 6.29E-05 4.07E-05 7.03E-05 9.25E-05 1.18E-01 8.51E+00 1.63E-05 5.18E-01 5.18E-01 5.18E-01 4.44E-01 4.37E-05 5.18E+01 4.47E-05 5.18E+01 7.77E+01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 4.81E-03 1.23FE-04 7.03E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.352E-05 1.18E-05 7.40E-05 4.07E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-01 5.18E-01 5	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+00 4.44E-03 3.70E-04 2.44E-03 3.70E-04 1.89E-03 3.63E-02 2.96E-05 1.07E-04 1.44E-05 1.18E-05 1.18E-05 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05 5.18E-01 4.44E-05 4.44E-01 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-05 4.44E-01 4.44E-05 4.44E-01 4.44E-01 4.44E-01 4.44E-01 4.44E-01 4.44E-01 4.44E-01 4.44E-05	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 8.51E-04 5.92E-03 4.44E-05 1.18E-05 1.18E-05 1.87E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.41E-05 5.18E-01 5.18E-01 5.18E-01 6.66E-05 5.18E-01 6.66E-05 5.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01 6.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 1.15E-03 3.70E-04 3.70E-04 3.70E-04 3.70E-04 3.70E-04 3.70E-04 4.70E-04 1.18E-03 2.85E-04 1.18E-03 2.85E-04 1.74E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 1.88E-01 4.44E-01 4.44E-01 3.77E-04 4.44E-01 3.77E-04 4.44E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 0.00E+00 3.55E-03 1.48E-03 1.52E-02 3.70E-03 7.77E-03 1.15E-01 6.29E-04 8.14E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.00E+00 1.00E+00 1.00E+01 1.15E+01 1.30E+01 1.30E+01 1.30E+01 1.30E+01 1.30E+01 1.30E+01 1.30E-03 1.07E+01 1.30E-03 1.07E+01 1.30E-03
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fe-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-229 Th-230 Th-234 U-233 U-234 U-235 U-237 V-238 U-240 Np-237 Np-239 Np-240 Pu-238 Pu-239	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.96E-03 3.70E-04 2.92E-03 3.70E-04 2.92E-03 3.73E-05 1.11E-04 2.55E-05 1.18E-05 9.25E-05 1.37E-04 3.70E-04 3.70E-05 1.38E-01 6.29E+00 1.11E+00 3.03E-05 5.18E-01	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.00E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-03 8.51E-03 7.03E-05 1.70E-04 1.81E-03 8.51E-03 7.03E-05 1.22E-05 2.96E-04 1.26E-04 1.26E-04 1.27E-04 1.48E+01 1.81E-01 2.44E-04 1.48E-01 1.78E-04 5.18E-01 1.78E-04 5.18E+01 1.78E-04 5.18E-01 1.78E-04 5.18E-01 1.78E-04 5.18E-01	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 1.41E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 3.70E-04 3.70E-05 3.70E-05 3.70E-05 1.18E-05 5.92E-05 1.52E-04 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.44E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 6.29E-05 3.70E-05 8.81E-01 8.81E-01 8.81E-01 8.81E-05 8.81E-05 8.81E-05 8.88E-01 9.99E-05 3.70E-05 8.88E+00 9.99E+00	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.33E-04 1.37E-01 1.70E-04 1.55E+01 1.70E-04 1.55E+00 1.41E+00 1.59E-04 1.57E+00 1.41E+00 1.59E-04 1.57E+00 1.44E+02 1.44E+02 1.44E+02 1.44E+02 1.44E+02 1.44E+04 1.57E+00 1.44E+04 1.57E+00 1.44E+05 1.44E+05 1.44E+05 1.44E+05 1.44E+05 1.46E-04 2.05E-04 2.0	3.26E-02 8.51E-04 4.81E-04 1.41E-03 8.51E-02 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.99E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 8.88E-05 1.11E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00 5.18E-01 5.18E-01 5.18E-01 5.18E-01 5.18E-01 6.29E+00 1.11E-05 6.29E+00 1.11E-05 6.29E+00 1.12E-05 5.18E-01 6.29E-05 6.29E-05 8.44E-01 6.88E-05 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 8.44E-01 9.99E-05 8.14E-06 8.88E+00 9.99E+00	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.30E-03 3.29E-03 6.29E-02 3.22E-05 1.15E-04 2.70E-04 2.70E-04 2.70E-04 2.70E-04 1.48E-03 2.44E-04 5.92E+00 1.11E+00 1.44E-05 5.18E-01 8.14E-05 4.44E-04 5.92E+00 1.11E+00 1.11E-01 8.14E-05 6.81E-01 8.14E-05 8.88E+00 9.99E+00 9.99E+00	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 3.59E-02 1.04E-05 4.81E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 6.29E-05 1.11E-05 1.18E-05 6.29E-05 6.29E-05 1.48E+01 6.3E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 5.18E-01 4.81E-01 6.3E-05 5.18E-01 6.3E-05	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 5.55E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.18E-05 1.740E-05 4.07E-05 1.70E-04 4.81E-05 1.26E-04 6.29E+00 7.03E-05 5.18E-01 1.11E+00 7.03E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 5.88E-01 4.81E-01 6.29E+00 7.03E-05 5.88E-01 6.82E-05 6.88E+00 9.99E+00	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 8.14E-05 7.03E-04 2.46E-03 3.70E-04 2.66E-03 7.03E-04 1.89E-03 1.07E-04 1.44E-05 1.18E-05 7.03E-05 1.07E-05 9.62E-05 1.07E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.84E-01 4.81E-01 4.8	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 4.52E-03 4.44E-05 1.38E-05 1.18E-05 1.8E-05 1.8E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 5.18E-01 5.18E-01 1.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.22E-04 3.70E-04 5.22E-04 3.70E-04 8.88E-04 1.48E-05 4.07E-04 8.88E-04 1.04E-04 1.18E-03 2.85E-04 1.00E+00 0.00E+00 0.00E+00 0.00E+00 1.89E-05 5.18E-01 1.88E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 2.15E-04 1.89E-03 5.55E-03 1.48E-03 7.77E-03 7.77E-03 7.77E-03 1.15E-01 6.29E-04 2.70E-03 3.52E-03 3.14E-04 1.89E-04 2.70E-03 3.55E-04 0.00E+00 0.00E+00 0.00E+00 1.63E+02 1.33E+01 1.30E+01 1.30E+01 1.30E-01
Eu-152 Sm-153 Eu-154 Eu-155 Eu-156 Tb-160 Ho-166m Be-7 Na-24 Mn-54 Fe-55 Fc-59 Co-57 Co-58 Co-60 Cu-64 Cu-67 W-181 W-185 W-187 W-188 Au-199 Pb-203 Th-230 Th-234 U-233 U-234 U-233 U-234 U-235 U-240 Np-237 Np-239 Np-240 Pu-241	8.88E-07 5.18E-02 2.15E-05 4.44E-02 1.81E-03 8.88E-04 2.48E-03 1.41E-01 8.88E-05 6.29E-04 2.92E-03 3.70E-04 2.92E-03 3.77E-05 1.11E-04 2.55E-05 1.33E-04 6.29E+00 3.03E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 5.88E-01 4.81E-01 4.81E-01 5.88E-01 4.81E-01 5.88E-01 4.81E-01 5.88E-01 6.88E-01 6.88E-01 6.88E-00 6.88E-00 6.99E+00 6.99E+00 6.99E+00 6.99E+00	6.29E-07 5.18E-02 1.04E-04 4.44E-02 1.81E-03 2.92E-03 1.41E-01 9.25E-05 5.92E-04 3.70E-04 3.70E-04 3.70E-03 3.70E-04 1.81E-03 7.03E-05 1.70E-04 1.81E-03 7.03E-05 1.22E-05 2.96E-04 1.88E-05 4.81E-04 1.26E-04 1.2	1.33E-01 2.29E-05 1.15E-01 5.55E-03 1.41E-03 4.44E-03 3.00E+00 1.48E-04 6.29E-04 4.44E-03 1.37E-03 5.92E-02 6.66E-05 1.70E-04 3.70E-04 3.70E-04 3.70E-05 1.18E-05 6.92E-05 1.52E-04 4.44E-05 1.81E-04 6.29E+00 1.11E+00 4.44E-05 1.81E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-01 4.81E-05 8.81E-01 6.29E-05 3.70E-05 8.88E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00	2.59E-01 1.07E-04 3.37E-01 3.70E-02 2.52E-03 1.07E-02 5.55E-01 1.15E-04 8.14E-04 4.07E-03 4.81E-03 5.55E-03 8.88E-04 2.59E-03 4.44E-02 3.66E-05 1.18E-04 7.77E-05 2.22E-04 1.33E-04 1.33E-04 1.37E-04 4.44E-05 2.37E-04 9.25E+01 3.70E+01 1.70E-04 4.44E-05 2.37E-04 9.25E+01 3.70E+01 1.70E-04 4.44E-05 2.37E-04 1.55E+00 1.41E+00 8.14E-05 1.59E-04 1.37E+00 8.14E-05 2.74E+02 1.96E-04 2.74E+02 2.74E+02 2.74E+02 2.74E+02	3.26E-02 7.77E-06 2.89E-02 8.51E-04 4.81E-04 4.81E-04 4.44E-05 4.44E-05 4.44E-04 1.48E-03 3.70E-04 1.89E-03 3.22E-04 1.07E-03 2.04E-02 2.15E-05 5.55E-05 4.07E-05 7.03E-05 6.29E+00 1.11E+00 1.52E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00	4.81E-02 1.78E-05 4.44E-02 1.70E-03 1.18E-03 3.37E-03 2.33E-01 1.37E-04 5.55E-04 4.07E-03 1.31E-02 7.40E-03 1.30E-03 3.29E-02 3.22E-05 1.15E-04 2.70E-04 1.48E-03 2.44E-04 9.99E-03 1.33E-04 3.70E-05 1.44E-04 5.92E+00 1.11E+00 4.44E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-01 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00 9.99E+00	1.37E-02 7.77E-06 1.22E-02 3.11E-04 2.37E-04 5.18E-04 3.59E-02 1.04E-05 4.81E-04 6.29E-04 3.70E-04 1.70E-03 3.37E-05 2.07E-04 1.89E-03 2.04E-05 6.29E-05 1.11E-05 6.29E-05 4.07E-05 9.25E-05 1.48E+01 8.51E+00 1.63E-05 5.18E-01 1.77E-05 4.44E-01 1.78E-05 5.18E-01 1.77E-05 4.44E-01 1.77E-05 4.44E-01 1.77E-05 4.44E-01 1.77E-01 1.77E+01 1.77FE+01	4.81E-02 2.18E-05 4.44E-02 1.85E-03 1.74E-03 1.74E-03 1.26E-01 2.37E-04 6.29E-03 3.70E-04 4.81E-03 2.29E-03 1.04E-01 3.52E-05 1.22E-04 1.41E-05 1.70E-04 4.81E-05 1.70E-04 4.81E-01 1.11E+00 7.03E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 6.29E+00 6.29E-05 1.89E-01 8.88E+00 9.99E+00 9.99E+00 9.99E+00	3.07E-02 9.62E-06 2.78E-02 9.62E-04 7.03E-04 7.03E-04 2.07E-03 7.77E-02 0.00E+00 0.00E+00 0.00E+01 0.3E-04 2.44E-03 3.70E-04 1.88E-03 7.03E-04 1.88E-03 7.03E-05 1.70E-05 9.62E-05 1.8E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 2.48E-05 5.18E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-01 4.81E-05 4.81E-05 4.81E-05 4.81E-00 4.81E-05 4.81E-00 4.81E-00 4.81E-05 4.81E-00 4.81E-00	5.18E-07 3.70E-02 4.44E-05 3.37E-02 1.22E-03 9.25E-04 1.63E-03 1.04E-01 0.00E+00 0.00E+00 4.44E-05 5.92E-04 1.52E-03 3.70E-04 2.81E-03 1.55E-04 5.92E-05 1.33E-04 5.92E-05 1.33E-04 5.92E-05 1.44E-05 1.89E-04 6.66E-05 1.89E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E-05 5.18E-01 1.18E-01	2.44E-02 3.52E-05 2.18E-02 7.40E-04 7.03E-04 1.15E-03 6.66E-02 0.00E+00 0.00E+00 3.00E-05 7.40E-04 1.15E-03 3.70E-04 5.92E-04 3.70E-04 5.92E-04 3.70E-04 6.92E-04 1.07E-04 6.92E-04 1.07E-04 6.92E-04 1.07E-04 6.92E-04 1.04E-04 1.18E-05 6.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.11E+00 1.89E-05 5.18E-01 4.81E-01 4.81E-01 1.89E-04 4.81E-01	1.55E-01 2.96E-03 1.96E-01 2.55E-02 1.41E-02 2.70E-02 4.44E-01 0.00E+00 0.00E+00 0.00E+00 1.89E-03 1.52E-02 3.70E-03 7.77E-03 1.15E-01 6.29E-04 2.70E-03 3.11E-01 6.29E-04 1.18E-03 3.12E-03 3.52E-03 5.55E-04 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.39E-01 1.39E-01 1.39E-01 1.39E-01 1.39E-01 1.39E-01 1.39E-01 1.39E-01

# APPENDIX B

**CODE LISTING** 

FIIDOS, VERSION 4.3

```
program main
      include 'fiparms.f'
      include 'varblock.f'
c start of program
c ....
     open(unit=1,file='fiidos.out',status='unknown')
c subroutine input is used to read and check the input data provided
c by the user for consistency and any possible error conditions. If
c succesful, rest of program should run without any difficulties.
     write(*,*) ' Reading input file.'
      call input
c subroutine fisfrc is used to convert the weapon yield in kilotons into the
c relative number of fission for each fissionable material-neutron energy set
     write(*,*) ' Calculating fission yields.'
     call fisfrc
c set up ORIGEN2 input deck and run ORIGEN2
     write(*,*) ' Writing ORIGEN2 input.'
     call orgsrc
write(*,*) ' Calling ORIGEN2.'
      call ORIGEN2
c final dose calculation loop is controlled by setting the time index
c (tmindx) to the desired value of the measurement index or exposure
c index. The measurement index will vary from 1 to nmeas, while the
c exposure index will vary from nmeas+1 to nmeas+nexp. Each exposure
c is linked to a particular measurement index via xcmeas.
      do 40 i=1,nexp
      tcncnew=xtexp(i)
       write(*,50) (8,1=1,70),i,nexp,xtexp(i),xdur(i)
       tmindx=xcmeas(i)
       call rri
       if(xitrm(i).gt.3) go to 30
      call rges
  30
     continue
       call sfcalc
       tmindx=i+nmeas
       call rri
       tmindx=i
       istidx=0
       isttm=tmindx
       call dose
       istidx=1
c Handle integrated doses (itpm=2)
      if(itpm.eq.2) then
       do 31 k=1,sss
         tdsum(k)=0.0
         td1sum(k)=0.0
         td2sum(k)=0.0
         td3sum(k)=0.0
         td4sum(k)=0.0
  31
        continue
        do 32 k=1,ppp
        sumexf(k)=0.0
       continue
  32
  33
        continue
        if(timest(istidx).le.xtexp(isttm))then
         istidx=istidx+1
```

```
go to 33
        endif
        oldtcnc=xtexp(isttm)
  34
        continue
        tcncnew=timest(istidx)
        tmindx=istidx-40
        if(tcncnew.ge.xtexp(isttm+nexp))then
         tcncnew=xtexp(isttm+nexp)
         tmindx=isttm+nexp+nmeas
        endif
        call rri
        tmindx=i
        call dose
        if(tcncnew.eq.xtexp(isttm+nexp))qo to 35
        oldtcnc=tcncnew
        istidx=istidx+1
       go to 34
 35
       continue
       endif
С
      if(iout4.eq.1) call outputf
  40 continue
      tmindx=nexp+1
      write(*,*) ' '
      write(*,*) ' Writing output file data.'
      call outputf
  50 format(70a1,'
                    Processing exposure number ',i2,' of ',i2,
    ;', texp=',g10.4,' dur=',g10.4,\)
c close up output file and end program
998 write(*,*)' FIIDOS finished'
     write(1,999)
999 format(/' end')
      close(unit=1)
      stop
     end
c block data initialization routine
     block data init
      include 'fiparms.f'
      include 'varblock.f'
      data tddcfsum,tddcf1sum /sss*0.,sss*0.,sss*0.,
      data tddcf2sum,tddcf3sum /sss*0.,sss*0.,sss*0.,
      data tddcf4sum /sss*0.,sss*0./
      data afp,afracc /www*0.,www*0./
      data aactin,aactp,akrxer,actinp /xxx*0.,yyy*0.,vvv*0.,xxx*0./
      data actpp /yyy*0./
      data sumfrac /ppp*0./
      data spec, sactp, sactin, skrxer /ooo*0.,ooo*0.,ooo*0.,ooo*0./
     data sfracc,gamma,gref /ooo*0.,ooo*0.,nnn*0./
      data alphaemit /
     ;1.0,1.0,0.0,1.0,1.0,1.0,0.0,1.0,0.0,1.0,
     ;0.0,0.0,1.0,1.0,1.0,0.0,1.0,1.0,0.0,0.0/
     data timest /
     ;2.78e-7,5.98e-7,1.29e-6,2.78e-6,5.98e-6,1.29e-5,
     ;2.78e-5,5.98e-5,1.29e-4,2.78e-4,5.98e-4,1.29e-3,
     ;2.78e-3,5.98e-3,1.29e-2,2.78e-2,5.98e-2,1.29e-1,
     ;2.78e-1,5.98e-1,1.29e+0,2.78e+0,5.98e+0,1.29e+1,
     ;2.78e+1,5.98e+1,1.29e+2,2.78e+2,5.98e+2,1.29e+3,
     ;2.78e+3,5.98e+3,1.29e+4,2.78e+4,5.98e+4,1.29e+5,
     ;2.78e+5,5.98e+5,1.29e+6,2.78e+6/
      end
```

```
fiparms.for - This file contains the variables dimension data to define
С
                 the problem size for the fiidos primary routines. This
С
С
                 enables a more straightforward path when additional
                 nuclides are added to fiidos or if some array sizes need to
С
                 be adjusted to accomodate a specific problem.
С
С
      integer zzz,yyy,xxx,www,vvv
      integer uuu,ttt,sss
      integer ppp,ooo,nnn
      real rzero
С
                            Maximum number of measurements + exposures
С
                            Should be ORIGEN2 AAA-50
С
      parameter (zzz=100)
                            Number of acitvation product nuclides
С
      parameter (yyy=20)
                            Number of actinide nuclides
С
      parameter (xxx=20)
                            Total number of FP nuclides (also for fractionation)
С
      parameter (www=150)
С
                            Number of noble gas nuclides (krypton and xenon)
      parameter (vvv=20)
С
                            Number of standard time steps for ORIGEN
                            storage vectors; must be less than JJJJ in
С
                            params.f (zzz+uuu must be less than JJJ)
С
      parameter (uuu=40)
                            Number of nuclides in DCF files
С
С
                            (wwww+xxxx+yyyy)
      parameter (ttt=190)
                            Maximum number of organs in DCF files (+1)
C
      parameter (sss=40)
                            Number of entries for Pu retention output
С
      parameter (ppp=30)
                            Number of gamma energy groups
С
      parameter (ooo=18)
                            Number of gamma radiation exposure factors
С
      parameter (nnn=21)
                            Set zero for real variables
C
      parameter (rzero=0.0)
C
```

```
integer xitrm,xitmi,xcmeas,xitdcf,tindex,tmindx
      integer nplut, numorgans, edosnum
      character*80 title,dcfidinfo
      character*11 orgnames
C
      common /doses/
                      td(zzz,sss),td1(zzz,sss),td2(zzz,sss),
                      td3(zzz,sss),td4(zzz,sss),
                      tdold(sss),td1old(sss),td2old(sss),td3old(sss),
                      td4old(sss),
                      tdsum(sss),td1sum(sss),td2sum(sss),td3sum(sss),
                      td4sum(sss),
                      tddcfsum(2,sss),tddcf1sum(2,sss),
                      tddcf2sum(2,sss),tddcf3sum(2,sss),
                      tddcf4sum(2,sss),
                      dcf(sss),osrnd(ttt,sss),alphaemit(xxx)
      common /organs/ numorgans(2),edosnum(2),dcfidinfo(2),
                      orgnames(2,sss)
                      itpm,ikrxer,iactp,iactin,ifrac,iplut,xitrm(zzz),
      common /flags/
                      xitmi(zzz),xcmeas(zzz),xitdcf(zzz)
                      nfrac,id(www),ffrac(www)
      common /fract/
      common /fusion/ fie,fue,xnu1(3),xnu14(3),xnufu,alpha(3),beta(3)
      common /inp/
                      nexp,xbr(zzz),xdur(zzz),xkfac(zzz),xtexp(zzz)
      common /inv/
                      afp(www),aactin(xxx),aactp(yyy),acttot,
                      akrxer(vvv),afracc(www),actinp(xxx),actpp(yyy)
      common /look/
                      lookfp(www),lookap(yyy),lookan(xxx)
      common /meas/
                      nmeas,nplut,xtmeas(zzz),xrimes(zzz),xactmes(zzz),
      common /plutm/
                      exfrac(zzz,ppp),sumfrac(ppp),sumexf(ppp),
                      oldexf(ppp)
                      iout1,iout2,iout3,iout4,iout5
      common /outf/
                      spec(ooo),gref(nnn),sactp(ooo),sactin(ooo),
      common /spect/
                      skrxer(ooo),sfracc(ooo),gamma(ooo)
      common /time/
                      times(zzz), xtra(zzz), tindex(zzz), tyrs(ppp), tmindx,
                      tcncnew,oldtcnc,timest(uuu),isttm,istidx
      common /title/
                      title
      common /yield/
                      ykt(6),yfis(6),twyf,yfisf(6),cmvkt
```

B-5

```
subroutine input
      include 'fiparms.f'
      include 'varblock.f'
c local variables
      integer txitrm,txitmi,txcmeas,txitdcf,origord(zzz)
      real lowdiff, lowtime
С
c this subroutine obtains and checks the input data from the fiidos user
c as much as possible - most random errors cause the program to crash
c by trying to read incompatible data formats. miscellaneous number
c errors may be caught before they cause trouble
c if users never made mistrakes, most of this subroutine wouldn't be here
c array title
                  - title of the problem
c variable itpm - index for type of problem. the two types of problems are:
                     (1) discreet exposure cases; n measurement times and
С
                         m exposure times, generally m >= n
                     (2) integrated case; 1 measurement time and
C
                         1 long term exposure time
c variable iout1 - index for output control
С
                     (0) suppress output
                     (1) print relative gamma emission spectrum at the time
С
                        of measurement or the measured activity of radio-
С
                         logical material, and the radiological contamination
С
                        scaling factor
С
c variable iout2 - index for output control
                     (0) suppress output
                     (1) print the relative radionuclide inventories for
С
C
                         fission products, activation products, and actinide
                         elements at the time of exposure
c variable iout3 - index for output control
                     (0) suppress output
                     (1) print the dose to each organ from each radionuclide.
C
c variable
           iout4 - index for output control
                     (0) suppress output
                     (1) print intermediate organ dose results for each
C
C
                         exposure incident
                  - index for table creation
 variable iout5
С
                     (0) suppress output
С
                     (1) create tables of organ doses for fission products,
                         activation products, actinides, and total as a
C
                         function of time - good for importing into spread-
С
                         sheet software for further analysis. Four
С
C
                         tables will be created for each set of dose
                         conversion factors used.
c variable nmeas
                 - number of measurement times
                  - index for type of i th radiological measurement
c array xitrm(i)
                    the six types of measurement are:
                    (1) radiation intensity - above contaminated surface
С
С
                     (2) radiation intensity - inside debris cloud
                     (3) radiation intensity - below debris cloud
С
                     (4) gross activity - airborne concentration
(5) gross activity - surface concentration
С
С
                    (6) gross activity - inhalation or ingestion intake
c array xtmeas(i) - time at which i th radiological measurement was made
c array xrimes(i) - i th radiation intensity measurement, for itrm = 1-3;
                    i th radionuclide index, if measured single species when
                    xitrm = 6
c array xitmi(i) - index for i th type of radiation intensity measurement
                    device; the five types are:
С
                     (1) tissue free-in-air
                     (2) air, free-in-air
C
С
                     (3) film badge, free-in-air
                    (4) film badge, in-situ(midplane)
С
```

```
(5) film badge, in-situ(isotropic)
c array xactmes(i) - i th measured gross activity
c variable nexp
                  - number of exposure incidents
c array xtexp(i)
                  - time at which i th exposure occurred
c array xcmeas(i) - index for correspondence to measurement time
                    possible values are:
С
                    (1) Use nearest measurement time > exposure time
                    (0) Use nearest measurement time < exposure time (default)
C
                    (-n) Use n th measurement time
                  - duration of i th exposure
c array xdur(i)
c array xbr(i)
                  - breathing rate during i th exposure
c array xkfac(i)
                  - ratio of airborne to surface activity during i th exposure
c array xitdcf(i) - index for type of dose conversion factor for i th exposure
                   - there are nine types:
                         inhalation dcf (ornl tm-190)
С
                    (1)
                         ingestion dcf (ornl tm-190)
С
С
                         inhalation (large particles) dcf (ornl tm-190)
С
                    (4)
                         inhalation dcf (icrp-30)
С
                    (5)
                         ingestion dcf (icrp-30)
С
                    (6)
                         inhalation (20 um large particles) dcf (icrp-30)
                    (7)
                         inhalation dcf (icrp-30)
C
                    (8)
                        ingestion dcf (icrp-30)
                        inhalation (10 um large particles) dcf (icrp-30)
С
                    (9)
С
                    (10) inhalation dcf (icrp-72)
С
                    (11) ingestion dcf (icrp-72)
                  - yield in kilotons from fm-ne set i. the six fm-ne sets are:
С
 array ykt(i)
                    (1) u-235, fast neut.
                                               (2) u-235,14-mev neut.
С
С
                    (3) u-238, fast neut.
                                               (4) u-238,14-mev neut.
С
                    (5)pu-239, fast neut.
                                               (6)pu-239,14-mev neut.
С
                     because these yields are not usually known or reported
                     an alternative input is available and suggested
С
С
                    (1) -1; for a flag
                                               (2) total yield
С
                    (3) u-235 total yield
                                               (4) u-238 total yield
                    (5) pu-239 total yield
                                               (6) total fusion yield
С
  variable iactp
                  - index for treatment of activation products. the options are:
                    (0) do not include activation products
                    (1) include activation products
C
 array actpp(i) - activation product production for i th radionuclide (ci/kt).
                    production data must be provided for twenty radionuclides
С
С
                    (1) be-7
                                  (2) na-24
                                               (3) mn-54
                                                            (4) fe-55
                    (5) fe-59
                                                            (8) co-60
                                  (6) co-57
                                               (7) co-58
С
                                  (10)cu-67
С
                    (9) cu-64
                                               (11) w-181
                                                            (12) w-185
С
                    (13) w-187
                                  (14) w-188
                                              (15)au-198
                                                            (16)au-199
                    (17)pb-203
                                  (18)mn-56
                                               (19)not used (20)not used
C
 variable iactin - index for treatment of actinide elements. the options are:
С
                    (0) do not include actinide elements
C
                    (1) include actinide elements
c array actinp(i) - actinide element production for i th radionuclide (ci/kt).
С
                    production data must be provided for twenty radionuclides
С
                    (1) th-229
                                   (2) th-230
                                                 (3) th-234
                                                               (4) u-233
С
                    (5)
                        u-234
                                   (6)
                                       u-235
                                                 (7)
                                                     u-237
                                                               (8) u-238
                                   (10)np-237
                    (9) u-240
                                                 (11)np-239
                                                               (12)np-240
С
                    (13)pu-238
                                  (14)pu-239
                                                 (15)pu-240
                                                               (16)pu-241
                    (17)am-241
                                   (18)cm-242
                                                 (19)not used
С
                                                               (20)not used
C
 variable ikrxer - index for treatment of krypton and xenon. the options are:
                    (0) do not modify inventory
                    (1) remove krypton and xenon
                  - index for treament of fractionation of fission products.
С
 variable ifrac
С
                    the two choices are:
С
                    (0) do not modify inventory
                    (1) modify inventory for fractionation
                 - the number of radiological nuclides to be modified by
c variable nfrac
                    fractionation
                  - index for the identification of the i th fission product
c array id(i)
                    radionuclide to be changed. indices of fission product
                    radionuclides are listed in subroutine fraci.
c array ffrac(i) - fraction of basic inventory of radionuclide i that is to
```

```
be present in fractionated fallout material
c variable iplut - index for treatment of plutonium bioassay
                    (0) Suppress calculation
C
                    (1) Perform plutonium bioassay calculation
c variable nplut - number of entries for plutonium calculation (max 30)
                 - time after exposure (yrs) for pu239 conc in urine
c array tyrs(i)
10
     continue
c problem identification and control data
      open(unit=2,file='input.dat',status='old')
      read(2,20) title
 20
     format(a80)
      read(2,*) itpm
      if(itpm.gt.2.or.itpm.lt.1)then
       write(*,*) ' Error reading input file. Bad value of itpm.'
       write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
      stop
      endif
      read(2,*) iout1
      if(iout1.gt.1.or.iout1.lt.0)then
       write(*,^*) ' Error reading input file. Bad value of iout1.'
       write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
      stop
      endif
      read(2,*) iout2
      if(iout2.gt.1.or.iout2.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iout2.'
       write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
      stop
      endif
      read(2,*) iout3
      if(iout3.gt.1.or.iout3.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iout3.'
       write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
       stop
      endif
      read(2,*) iout4
      if(iout4.gt.1.or.iout4.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iout4.'
       write(*,*) ' Program quitting'
       close(unit=1)
      close(unit=2)
      stop
      endif
      read(2,*) iout5
      if(iout5.gt.1.or.iout5.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iout5.'
       write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
      stop
      endif
30 continue
c radiological measurement data
     read(2,*) nmeas
```

```
if(nmeas.le.0) then
       write(*,*) ' Number of measurements cannot be zero or negative.'
       write(*,*) ' Program quitting.'
       close(unit=1)
       close(unit=2)
       stop
      endif
      if(itpm.eq.2.and.nmeas.gt.33) then
       write(*,*) ' Number of measurements must be less than 33 when' write(*,*) ' itpm = 2. Program quitting.'
       close(unit=1)
       close(unit=2)
       stop
      endif
      if(nmeas.gt.50) then
       write(*,*) ' Number of measurements > 50. Problem will not run'
       write(*,*) ' if nmeas+nexp>100.'
       if(nmeas.gt.zzz) then
        write(*,*) ' Program quitting.'
        close(unit=1)
        close(unit=2)
        stop
       endif
      endif
      do 40 i=1,nmeas
       read(2,*) xitrm(i),xtmeas(i),xrimes(i),xitmi(i),xactmes(i)
       origord(i)=i
       if(xitrm(i).lt.1.or.xitrm(i).gt.6.or.
          xitmi(i).lt.0.or.xitmi(i).gt.5) then
        write(*,*) ' Error reading input file. Bad itrm or itmi value.'
        write(*,*) ' Last value of tmeas read was ',xtmeas(i)
        write(*,*) ' Program quitting'
        close(unit=1)
        close(unit=2)
        stop
       endif
       if(xtmeas(i).lt.2.78e-7) then
        write(*,*) ' Times shorter than 2.78e-7 hours not permitted.'
        write(*,*) ' Adjusting time ',xtmeas,' to 2.78e-7 hours.'
        xtmeas(i)=2.78e-7
       endif
       if(xtmeas(i).gt.1.e7) then
        write(*,*) ' Calculations for times longer than 1000 years'
        write(*,*) ' are not reliable, but the problem will run.'
       endif
 40
      continue
c sort measurement data in chronologic order
      if(nmeas.gt.1) then
       do 42 i=1,nmeas
        do 41 j=1,nmeas-1
         if(xtmeas(j).gt.xtmeas(j+1))then
          txitrm=xitrm(j)
          txtmeas=xtmeas(j)
          txrimes=xrimes(j)
          txitmi=xitmi(j)
          txactmes=xactmes(j)
          torigord=origord(j)
С
          xitrm(j)=xitrm(j+1)
          xtmeas(j)=xtmeas(j+1)
          xrimes(j)=xrimes(j+1)
          xitmi(j)=xitmi(j+1)
          xactmes(j)=xactmes(j+1)
          origord(j)=origord(j+1)
С
```

```
xitrm(j+1)=txitrm
          xtmeas(j+1)=txtmeas
          xrimes(j+1)=txrimes
          xitmi(j+1)=txitmi
          xactmes(j+1)=txactmes
          origord(j+1)=torigord
         endif
 41
       continue
 42
       continue
      endif
c dose calculation data and determination of relevant measurement
     read(2,*) nexp
      if(nexp.le.0) then
      write(*,*) ' Number of exposures cannot be zero or negative.'
       write(*,*) ' Program quitting.'
       close(unit=1)
       close(unit=2)
      stop
      endif
      if(itpm.eq.2.and.nexp.gt.33) then
      write(*,*) ' Number of exposures must be less than 33 when'
       write(*,*) ' itpm = 2. Program quitting.'
       close(unit=1)
      close(unit=2)
      stop
      endif
      if(nexp+nmeas.gt.100) then
       write(*,*) ' nmeas+nexp exceeds max value of 100.'
      write(*,*) ' Program quitting'
       close(unit=1)
       close(unit=2)
       stop
      endif
      do 60 i=1,nexp
      lowtime = 1e7
       txcmeas = 0
       read(2,*) xtexp(i),xcmeas(i),xdur(i),xbr(i),xkfac(i),xitdcf(i)
       if(xcmeas(i).gt.1) then
       write(*,*) ' Error reading input file. Bad cmeas number.'
        write(*,*) ' Last value of texp read was ',xtexp(i)
        write(*,*) ' Program quitting'
        close(unit=1)
        close(unit=2)
       stop
       endif
       if(xitdcf(i).lt.1.or.xitdcf(i).gt.2) then
        write(*,*) ' Error reading input file. Bad itdcf number.'
        write(*,*) ' Last value of texp read was ',xtexp(i)
        write(*,*) ' Program quitting'
        close(unit=1)
        close(unit=2)
        stop
       endif
       if(abs(xcmeas(i)).gt.nmeas) then
        write(*,*) ' Error in exposure/measurement correspondence.'
        write(*,*) ' Last value of texp read was ',xtexp(i)
        write(*,*) ' Program quitting'
        close(unit=1)
        close(unit=2)
       stop
       endif
       if(xtexp(i).lt.2.78e-7) then
       write(*,*) ' Times shorter than 2.78e-7 hours not permitted.'
        write(*,*) ' Adjusting time ',xtexp,' to 2.78e-7 hours.'
       xtexp(i)=2.78e-7
```

```
if(xtexp(i).gt.1.e7) then
        write(*,*) ' Calculations for times longer than 1000 years'
        write(*,*) ' are not reliable, but the problem will run.'
        write(*,*) ' Some elements may underflow in ORIGEN, causing'
        write(*,*) ' problems for FIIDOS in the dose calculation.'
       endif
c ....
c determine corresponding measurement time (for xcmeas(i)=0 or 1)
      if(xcmeas(i).eq.0) then
        do 50 j=1,nmeas
         lowdiff=xtexp(i)-xtmeas(j)
         if(lowdiff.gt.rzero.and.lowdiff.lt.lowtime) then
          lowtime=lowdiff
          txcmeas=j
         endif
50
       continue
        if(txcmeas.eq.0) then
         write(*,*) ' Warning! No measurement times earlier than ',
        xtexp(i)
         write(*,*) ' Adjusting to find closest later time.'
         xcmeas(i)=1
        endif
       endif
С
       if(xcmeas(i).eq.1) then
       do 51 j=1,nmeas
         lowdiff=xtmeas(j)-xtexp(i)
         if(lowdiff.gt.rzero.and.lowdiff.lt.lowtime) then
          lowtime=lowdiff
          txcmeas=j
         endif
        continue
51
        if(txcmeas.eq.0) then
        write(*,*) ' Warning! No measurement times later than ',
         xtexp(i)
         write(*,*) ' Adjusting correspondence to closest earlier time.'
         xcmeas(i)=0
         do 52 j=1,nmeas
          lowdiff=xtexp(i)-xtmeas(j)
          if(lowdiff.gt.rzero.and.lowdiff.lt.lowtime) then
           lowtime=lowdiff
           txcmeas=j
          endif
 52
         continue
        endif
       endif
С
       if(txcmeas.eq.0.and.xcmeas(i).ge.0) then
       write(*,*) ' Bizarre error in exposure-measurement time',
       'correspondence!'
       write(*,*) ' Program quitting.'
        close(unit=1)
        close(unit=2)
       stop
       endif
       if(xcmeas(i).ge.0)xcmeas(i)=txcmeas
       if(xcmeas(i).lt.0)then
        do 53 j=1,nmeas
         if((abs(xcmeas(i)).eq.origord(j)).and.(xcmeas(i).lt.0))
           xcmeas(i)=j
       continue
 53
      endif
 60
     continue
c ....
```

```
c sort exposure data in chronologic order
     if(nexp.qt.1) then
      do 72 i=1,nexp
       do 71 j=1,nexp-1
         if(xtexp(j).gt.xtexp(j+1))then
          txtexp=xtexp(j)
          txcmeas=xcmeas(j)
          txdur=xdur(j)
          txbr=xbr(j)
          txkfac=xkfac(j)
          txitdcf=xitdcf(j)
C
          xtexp(j)=xtexp(j+1)
          xcmeas(j)=xcmeas(j+1)
          xdur(j)=xdur(j+1)
          xbr(j)=xbr(j+1)
          xkfac(j)=xkfac(j+1)
          xitdcf(j)=xitdcf(j+1)
С
          xtexp(j+1)=txtexp
          xcmeas(j+1)=txcmeas
          xdur(j+1)=txdur
          xbr(j+1)=txbr
          xkfac(j+1)=txkfac
          xitdcf(j+1)=txitdcf
         endif
 71
       continue
      continue
      endif
c check measurement and exposure data for various incompatibilities
c integrated exposures (itpm=2) not allowed with itrm=6
      if(itpm.eq.2) then
      do 73 i=1,nexp
        if(xitrm(i).eq.6) then
         write(*,*) ' You cannot use an integrated exposure (itpm=2)'
         write(*,*) ' with a gross activity ingestion/inhalation ',
                    '(itrm=6).'
        write(*,*) ' Program quitting.'
         close(unit=1)
         close(unit=2)
         stop
        endif
 73
       continue
      endif
c cannot have multiple exposures to a single ingestion
      do 75 i=1,nmeas
       if(xitrm(i).eq.6) then
        itrmexp=0
        do 74 j=1,nexp
         if(xcmeas(j).eq.i) itrmexp=itrmexp+1
74
        continue
        if(itrmexp.gt.1) then
         write(*,*) ' You cannot have multiple exposures to a single'
         write(*,*) ' gross activity ingestion or inhalation (itrm=6).'
         write(*,*) ' Program quitting.'
         close(unit=1)
        close(unit=2)
        stop
       endif
      endif
75 continue
c ....
c shot data
c ....
```

```
read(2,*) (ykt(i),i=1,6)
      read(2,*) iactp
      if(iactp.gt.1.or.iactp.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iactp.'
      write(*,*) ' Program quitting.'
      close(unit=1)
      close(unit=2)
      stop
      endif
      if(iactp.eq.0) go to 80
     read(2,*) (actpp(i),i=1,20)
 80
     continue
      read(2,*) iactin
      if(iactin.gt.1.or.iactin.lt.0)then
      write(*,*) ' Error reading input file. Bad value of iactin.'
      write(*,*) ' Program quitting.'
      close(unit=1)
      close(unit=2)
      stop
      endif
     if(iactin.eq.0) go to 90
     read(2,*) (actinp(i),i=1,20)
90
     continue
c fallout data
C ....
      read(2,*) ikrxer
      if(ikrxer.gt.1.or.ikrxer.lt.0)then
       write(*,*) ' Error reading input file. Bad value of ikrxer.'
       write(*,*) ' Program quitting.'
      close(unit=1)
      close(unit=2)
      stop
      endif
      read(2,*) ifrac
      if(ifrac.gt.1.or.ifrac.lt.0)then
      write(*,*) ' Error reading input file. Bad value of ifrac.'
      write(*,*) ' Program quitting.'
      close(unit=1)
      close(unit=2)
      stop
      endif
      if(ifrac.eq.0) go to 120
      open(unit=3,file='frac.gam',status='unknown')
     nfrac=0
 105  read(2,*,end=110) id(nfrac+1)
     read(2,*) ffrac(nfrac+1)
     read(2,*)(gamma(j),j=1,ooo)
      write(3,*)(gamma(j),j=1,000)
     nfrac=nfrac+1
     go to 105
110 continue
     close(unit=3)
120 continue
c ....
c plutonium data
      read(2,*)iplut
      if(iplut.gt.1.or.iplut.lt.0)then
       write(*,*) ' Error reading input file. Bad value of iplut.'
       write(*,*) ' Program quitting.
      close(unit=1)
      close(unit=2)
      stop
      endif
      if(iplut.eq.0) go to 140
      read(2,*)nplut
```

```
if(nplut.gt.ppp) then
       write(*,*) ' Number of entries for Pu retention currently'
       write(*,*) ' limited to ',ppp
       write(*,*) ' Program quitting.'
       close(unit=1)
       close(unit=2)
       stop
      endif
      read(2,*) (tyrs(i),i=1,nplut)
140 continue
      close(unit=2)
c write output file header info
      write(1,500) title,itpm,iout1,iout2,iout3,iout4,iout5
      write(1,510) nmeas
      write(1,520) (xitrm(i), i=1, nmeas)
      write(1,530) (xtmeas(i),i=1,nmeas)
      write(1,540) (xrimes(i),i=1,nmeas)
      write(1,550) (xitmi(i),i=1,nmeas)
      write(1,560) (xactmes(i),i=1,nmeas)
      write(1,570) nexp
      write(1,580) (xtexp(i),i=1,nexp)
      write(1,590) (xcmeas(i),i=1,nexp)
      write(1,600) (xdur(i),i=1,nexp)
      write(1,610) (xbr(i),i=1,nexp)
      write(1,620) (xkfac(i),i=1,nexp)
      write(1,630) (xitdcf(i),i=1,nexp)
      write(1,650) iactp
      write(1,670) iactin
      write(1,690) ikrxer
      write(1,700) ifrac
      if(ifrac.ne.1) go to 230
      write(1,710) nfrac
      write(1,720) (id(i), i=1, nfrac)
      write(1,730) (ffrac(i),i=1,nfrac)
 230 write(1,740) iplut
      if(iplut.ne.1) go to 240
      write(1,750) nplut
      write(1,760) (tyrs(i), i=1, nplut)
c Set up integrated exposures if itpm=2 (Not echoed in output file)
c ....
 240 if(itpm.eq.2) then
       do 300 i=1,nexp
          xtexp(i+nexp)=xtexp(i)+xdur(i)
          xcmeas(i+nexp)=xcmeas(i)
          xdur(i+nexp)=xdur(i)
          xbr(i+nexp)=xbr(i)
          xkfac(i+nexp)=xkfac(i)
          xitdcf(i+nexp)=xitdcf(i)
 300
       continue
      endif
C ....
c format block
 500 format(34x,'fiidos
     ;8x,'title:',3x,a80,/
     ;8x,80('-')/
                problem type
                                                                1/2',i10/
     ;8x,'itpm
                                           single/integrated
     ;8x,'iout1
                                                                0/1',i10/
                  print spectrum
                                              no/yes
     ;8x,'iout2
                 print inventory
                                                                 0/1',i10/
                                               no/yes
     ;8x,'iout3
                 print dose inventory
                                               no/yes
                                                                 0/1',i10/
     ;8x,'iout4;8x,'iout5
                                                                0/1',i10/
0/1',i10)
                 print intermediate doses
                                              no/yes
                 print dose tables
                                               no/yes
 510 format(/
```

```
number of measurement calculations
                                                                ',i10)
   ;8x,'nmeas
520 format(
   ;8x,'itrm
                rad measurement indices
    ;10i10,19(/64x,10i10))
530 format(
               time of rad measurements
   ;8x,'tmeas
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
540 format(
    ;8x,'rimes
                rad intensity (itrm=1-3); index nuclide (itrm=6)',
    ;5x,1p10g10.3,19(/69x,1p10g10.3))
550 format(
   ;8x,'itmi
                meas index tis/air/fb/fb-man/fb-man 1/2/3/4/5 ',
   ;10i10,19(/64x,10i10))
560 format(
   ;8x,'actmes activity measurement (itrm=4-6)
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
570 format(/
   ;8x,'nexp
                                                                ',i10)
                number of exposure calculations
580 format(
    ;8x,'texp
                exposed @ h+(hr)
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
590 format(
   :8x,'icmeas rad exposure to measurement indices (re-sorted) ',
    ;10i10,19(/64x,10i10))
600 format(
   ;8x,'dur
                duration (hr)
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
610 format(
   ;8x,'br
                breathing rate (m**3/hr)
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
620 format(
                resuspension factors (m**-1)
   ;8x,'kfac
   ;5x,1p10g10.3,19(/69x,1p10g10.3))
630 format(
    ;8x,'itdcf
                dose conversion factor set index 1/2
   ;10i10,19(/64x,10i10))
650 format(/
                activation products
                                                             0/1',i10)
   ;8x,'iactp
                                            no/yes
670 format(
   ;8x,'iactin actinides
                                            no/yes
                                                             0/1',i10)
690 format(
   ;8x,'ikrxer noble gases removed
                                            no/yes
                                                             0/1',i10)
700 format(
   ;8x,'ifrac fractionation
                                                             0/1',i10)
                                            no/yes
710 format(
   ;8x,'nfrac number of fission products to be fractionated ',i10)
720 format(/8x,'isotope id''s',5x,5i10/(25x,5i10))
730 format(/8x,'fractionation factor ',1p5g10.3/(29x,5g10.3))
740 format(/
   ;8x,'iplut
               plutonium bioassay
                                            no/yes
                                                             0/1',i10)
750 format(
   ;8x,'nplut number of entries for plutonium bioassay
                                                                ',i10)
760 format(
   ;8x,'tyrs
                times after shot for Pu conc in urine
   ;5x,1p10q10.3)
770 format(//34x,'fiidos output')
900 continue
    write(1,770)
    return
    end
```

```
subroutine fisfrc
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine calulates the total weapon yield in number of fissions and
c the fraction of that yield from each fissionable-neutron energy set.
c variable ykttot - total yield of device both fusion and fission (new input)
 variables ykt235,ykt238,ykt239- fission yield of u235,u238,pu239 (new input)
C
  variables yktfus - fusion yield
                                                                    (new input)
                   - yield in kilotons from fm-ne set i
c array ykt(i)
                                                                    (old input)
c array yfis(i)
                    - yield in fissions from fm-ne set i
c variable twyf
                    - total weapon yield in fissions.
c array yfisf(i)
                   - fraction of total weapon yield from fm-ne set i.(results)
  variable cmvkt
                   - conversion factor of fissions per kt
С
                   - fission fraction of yield (derived)
  variable fif
С
 variable fie
                   - energy recovered per fission
c variable fue
                   - energy recovered per fusion
                   - neutrons released from 1 mev fission
c variable xnul
                   - neutrons released from 14 mev fission
C
  variable xnu14
                   - neutrons released from fusion
  variable xnufu
c variable fifil
                   - probability of a fission neutron causing a 1 mev fission
c variable fufil4 - probability of a fusion neutron causing a 14 mev fission
c variable fufil - probability of a fusion neutron causing a 1 mev fission
С
  variable alpha
                   - ratio of fufil4/fifil
                   - ratio of fufil/fifil
  variable beta
C
                   - fraction of yield from fissions from 1 mev neutrons
c variable frac1
c variable frac14 - fraction of yield from fissions from 14 mev neutrons
c variable fracfu - fraction of yield from fusion
      twyf=0.0
      frac14=0.0
      frac1=0.0
      fracfu=0.0
      if(ykt(1).ge.0) go to 20
c option to determine the fission fractions from fusion/fission ratios
c uses new input
      ykttot=ykt(2)
      ykt235=ykt(3)
      ykt238=ykt(4)
      ykt239=ykt(5)
      yktfus=ykt(6)
      if(abs(ykttot-ykt235-ykt238-ykt239-yktfus).gt.0.02*ykttot)
     ;write(*,*)' recheck fission/fusion yield inputs ; do not add up'
      fif=(ykt235+ykt238+ykt239)/ykttot
      do 10 i=1,3
      a=(1-fif)*fie/fue*xnufu*(xnu14(i)-xnu1(i))*alpha(i)
      b=fif*xnu1(i)+(1-fif)*fie/fue*xnufu*(alpha(i)+beta(i))
      c=-fif
      if(xnu14(i).ne.xnu1(i).and.a.ne.0)fifi1=(-b+sqrt(b*b-4*a*c))/(2*a)
      if(xnu14(i).eq.xnu1(i).or .a.eq.0)fifi1=-c/b
      frac14=(1-fif)*fie/fue*xnufu*alpha(i)*fifi1
      frac1=fif-frac14
      fracfu=(1-fif)
      if(i.eq.1)ykt(1)=ykt235*frac1
      if(i.eq.1)ykt(2)=ykt235*frac14
      if(i.eq.2)ykt(3)=ykt238*frac1
      if(i.eq.2)ykt(4)=ykt238*frac14
      if(i.eq.3)ykt(5)=ykt239*frac1
      if(i.eq.3)ykt(6)=ykt239*frac14
10
      continue
 20
      do 30 i=1.6
         yfis(i)=ykt(i)*cmvkt
                 =twyf + yfis(i)
          t.wvf
 30
      continue
 40
      do 50 i=1,6
```

```
subroutine orgsrc
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine writes out the input file for the origen2 code
 it uses the data read in by input.dat
c ....
           a - first section of origen2 input
c array
          b - second section of origen2 input
c array
          c - third section of origen2 input
c array ahe - curies of actinides
                                             (heavy elements)
c array ale - curies of activation products (light elements)
c array ihe - origen2 actinide identification number
c array ile - origen2 activation product identification number
      character*80 a(45),b(41),c
С
      equivalence (yfisf(1),u235ff),(yfisf(3),u238ff),(yfisf(5),pu239ff)
      equivalence (yfisf(2),u23514),(yfisf(4),u23814),(yfisf(6),pu23914)
C
      dimension ahe(100), ihe(100), ale(100), ile(100)
      dimension idactp(20),dactp(20),idactin(20),dactin(20)
     data idactp/04070,110240,250540,260550,260590,270570,
     ; 270580,270600,290640,290670,741810,741850,741870,
     ; 741880,791980,791990,250560,000000,000000,000000/
     data idactin/902290,902300,902340,922330,922340,922350,
     ;922370,922380,922400,932370,932390,932400,942380,
     ;942390,942400,942410,952410,962420,000000,000000/
     data dactp/1.,1.28E-05,2.57E-08,8.45E-09,1.78E-07,1.,
     ;1.13E-07,4.17E-09,1.52E-05,3.11E-06,6.62E-08,1.07E-07,8.06E-06,
     ;1.16E-07,2.97E-06,2.55E-06,7.46E-05,1.,1.,1./
     data dactin/2.99E-12,2.85E-13,3.33E-07,1.39E-13,8.98E-14,3.12E-17,
     ;1.19E-06,4.92E-18,1.37E-05,1.03E-14,3.41E-06,1.78E-04,2.50E-10,
     ;9.13E-13,3.36E-12,1.53E-09,5.08E-11,4.92E-08,1.,1./
     data a/
     ; '-1',
     ;'-1',
     ; '-1',
     ; 'BAS
                1E14 FISSIONS'
     ;'LIB
              0 1 2 3 0 0 0 9 3 0 1 15',
     ; 'PHO
              101 102 103 10',
     ; 'CUT 7 0.0 25 -1. 26 -1. 27 .1 -1',
     ;'OPTL 8 8 8 8 8 8 5 17*8',
     ;'OPTA
            8 8 8 8 8 8 5 17*8',
     ; 'OPTF
            8 8 8 8 8 8 5 17*8',
     ;'RDA
              title for run',
              test of inventory mix',
    ;'TIT
     ;'RDA
              put cinder u235 ff inventory in vector -1',
     ; 'TNP
              -1 2 -1 -1 1 1'
     ;'RDA
              put cinder u238 ff inventory in vector -2',
     ;'INP
              -2 2 -1 -1 1 1'
     ;'RDA
              put cinder pu239 ff inventory in vector -3',
     ;'INP
              -3 2 -1 -1 1 1'
     ;'RDA
              put endf6 u235 14 inventory in vector -4',
     ;'INP
              -4 2 -1 -1 1 1'
     ;'RDA
              put endf6 u238 14 inventory in vector -5',
    ;'INP
              -5 2 -1 -1 1 1'
              put endf6 pu239 14 inventory in vector -6',
     ;'RDA
     ;'INP
              -6 2 -1 -1 1 1'
     ;'RDA
              move fraction of cinder u235 ff inventory to vector 1',
     ; 'MOV
              -1 1 0 1.0',
     ;'RDA
              add fraction of cinder u238 ff inventory to vector 1',
     ; 'ADD
              -2 1 0 1.0',
     ;'RDA
              add fraction of cinder pu239 ff inventory to vector 1',
     ;'ADD
              -3 1 0 1.0',
     ; 'RDA
              move fraction of endf6 u235 14 inventory to vector 1',
     ;'ADD
              -4 1 0 1.0',
```

```
;'ADD
              -5 1 0 1.0',
     ;'RDA
              add fraction of endf6 pu239 14 inventory to vector 1'.
     ; 'ADD
              -6 1 0 1.0',
     ;'RDA
              put actinide inventory in vector -7',
     ;'INP
              -7 2 -1 -1 1 1',
     ;'RDA
              add fraction of actinide inventory to vector -7',
     ;'ADD
              -7 1 0 1.0'.
     ;'RDA
              put activated light element inventory in vector -8',
     ;'INP
              -8 2 -1 -1 1 1'
     ;'RDA
              add fraction of light element inventory to vector -8',
     ;'ADD
              -8 1 0 1.0',
     ; 'HED
              1 CHARGE'/
     data b/
     ;'RDA
              decay inv in vector 1 to .001s, put results in vector -1',
     ; 'DEC
               2.778E-7 1 -1 3 0 ',
     ; 'DEC
               5.985E-7 -1 -2 3 0 ',
     ; 'DEC
               1.289E-6 -2 -3 3 0 ',
               2.778E-6 -3 -4 3 0 ',
     ; 'DEC
               5.985E-6 -4 -5 3 0 ',
     ; 'DEC
     ; 'DEC
               1.289E-5 -5 -6 3 0 ',
     ; 'DEC
               2.778E-5 -6 -7 3 0 ',
     ; 'DEC
               5.985E-5 -7 -8 3 0 ',
     ; 'DEC
               1.289E-4 -8 -9 3 0 '
     ; 'DEC
               2.778E-4 -9 -10 3 0 '
     ; 'DEC
               5.985E-4 -10 -11 3 0 '
     ; 'DEC
               1.289E-3 -11 -12 3 0 '
     ; 'DEC
               2.778E-3 -12 -13 3 0 '
               5.985E-3 -13 -14 3 0 '
     ; 'DEC
               1.289E-2 -14 -15 3 0 '
     ; 'DEC
               2.778E-2 -15 -16 3 0 '
     ; 'DEC
     ; 'DEC
               5.985E-2 -16 -17 3 0 '
     ; 'DEC
               1.289E-1 -17 -18 3 0 '
               2.778E-1 -18 -19 3 0 '
     ; 'DEC
     ; 'DEC
               5.985E-1 -19 -20 3 0 '
     ; 'DEC
               1.289E+0 -20 -21 3 0 '
     ; 'DEC
               2.778E+0 -21 -22 3 0
     ; 'DEC
               5.985E+0 -22 -23 3 0 '
     ; 'DEC
               1.289E+1 -23 -24 3 0 '
               2.778E+1 -24 -25 3 0 '
     ; 'DEC
     ; 'DEC
               5.985E+1 -25 -26 3 0 '
     ; 'DEC
               1.289E+2 -26 -27 3 0
     ; 'DEC
               2.778E+2 -27 -28 3 0 '
     ; 'DEC
               5.985E+2 -28 -29 3 0
               1.289E+3 -29 -30 3 0
     ; 'DEC
               2.778E+3 -30 -31 3 0 '
     ; 'DEC
     ; 'DEC
               5.985E+3 -31 -32 3 0 '
     ; 'DEC
               1.289E+4 -32 -33 3 0 '
     ; 'DEC
               2.778E+4 -33 -34 3 0 '
     ; 'DEC
               5.985E+4 -34 -35 3 0 '
     ; 'DEC
               1.289E+5 -35 -36 3 0 '
     ; 'DEC
               2.778E+5 -36 -37 3 0 '
     ; 'DEC
               5.985E+5 -37 -38 3 0 ',
     ; 'DEC
               1.289E+6 -38 -39 3 0 '
     ; 'DEC
               2.778E+6 -39 -40 3 0 '/
С
c use data from fiidos
      ntimes=nmeas+nexp
      if(itpm.eq.2)ntimes=ntimes+nexp
      do 10 n=1,nmeas
       times(n)=xtmeas(n)
 10
      continue
      do 20 n=1,nexp
       times(n+nmeas)=xtexp(n)
       if(itpm.eq.2)times(n+nmeas+nexp)=xtexp(n+nexp)
```

add fraction of endf6 u238 14 inventory to vector 1',

```
20
      continue
C
      if(iactp.ne.0) then
       nactp=yyy
       do 30 i=1,nactp
        ile(i)=idactp(i)
        ale(i)=actpp(i)
 30
       continue
      else
      nactp=1
       ile(1)=0
       ale(1)=0.
      endif
С
      if(iactin.ne.0) then
      nactin=xxx
       do 40 i=1, nactin
        ihe(i)=idactin(i)
        ahe(i)=actinp(i)
 40
       continue
      else
       nactin=1
       ihe(1)=0
       ahe(1)=0.
      endif
c set up desired decay times based on standard decay times
      intmax=1
      do 50 nt=1,ntimes
      bigind=3*log10(times(nt)/2.778e-7)+.99999
       tindex(nt)=min(bigind,40.)
       xtra(nt) = times(nt) - 2.778e - 7*10.**((tindex(nt) - 1.)/3.)
       intmax=max(tindex(nt),intmax)
 50
      continue
      open(unit=3,file='orgsrc.dat',status='old')
      open(unit=2,file='tape5.inp')
С
      write(2,90)(a(i),i=1,11)
      write(2,100)title
      write(2,90)(a(i),i=13,25)
      write(2,101)u235ff*1.e-6
      write(2,90)a(27)
      write(2,102)u238ff*1.e-6
      write(2,90)a(29)
      write(2,103)pu239ff*1.e-6
      write(2,90)a(31)
      write(2,104)u23514*1.e-6
      write(2,90)a(33)
      write(2,105)u23814*1.e-6
      write(2,90)a(35)
      write(2,106)pu23914*1.e-6
      if(nactin.ne.0)then
      write(2,90)(a(i),i=37,40)
      endif
      if(nactp.ne.0)then
      write(2,90)(a(i),i=41,44)
      endif
      write(2,90)a(45)
      write(2,90)(b(nt),nt=1,intmax+1)
      do 60 nt=1,ntimes
      write(2,108)xtra(nt),-1*tindex(nt),-1*(nt+40),3,1
 60
      continue
      write(2,107)
      write(2,108)xtra(1),-1*tindex(1),2,3,1
      write(2,109)2,times(1)
      write(2,110)2
```

```
70
      read(3,90,end=80)c
      write(2,90)c
      go to 70
 80
      continue
      write(2,111)
     ; (ihe(i),ahe(i)/dactin(i)*3.7e10/6.023e23/1.45e+9,i=1,nactin),0,0.
      write(2,113)
      write(2,112)
     ; (ile(i),ale(i)/dactp(i)*3.7e10/6.023e23/1.45e+9,i=1,nactp),0,0.
      write(2,113)
      write(2,114)
С
90
      format(a80)
95
      format(1p,e10.3,i5,e10.3)
      format('TIT
100
                       ',a80)
101
      format('MOV
                       -1 1 0 ',1pg10.3)
                      -2 1 0 ',1p,g10.3)
-3 1 0 ',1p,g10.3)
102
      format('ADD
103
      format('ADD
                      -4 1 0 ',1pg10.3)
-5 1 0 ',1p,g10.3)
-6 1 0 ',1p,g10.3)
104
      format('ADD
      format('ADD
105
      format('ADD
106
107
      format('RDA
                       DUMMY DECAY')
      format('DEC
                       ',g12.5,4i6)
108
                      ',i3,1x,1pg8.2,'H')
',i3,' 1 -1 0')
109
      format('HED
      format('OUT
110
111
      format(('2',4(1x,i6,1p,e12.5)))
      format(('1',4(1x,i6,1p,e12.5)))
112
113
      format(' 0')
114
      format('END')
      close(unit=3)
      close(unit=2)
      return
      end
```

```
subroutine rri
       include 'fiparms.f'
       include 'varblock.f'
c calculates the relative radionuclide inventory for the purpose of
\ensuremath{\mathtt{c}} providing data to be used to modify the relative gamma emission spectum
c ....
c indices for control of inventory treatment
c variable ikrxer - index for treatment of noble gases
c variable iactp - index for treatment of activation products
c variable iactin - index for treatment of actinides
c variable ifrac - index for treatment of fractionation of fission products
c 0) no treatment
                                  1) treatment required
c calculate gross fission product inventory
    call gfpi
c remove krypton and xenon if desired
c .....
if(ikrxer.eq.1) call krxeri
c add activation products if desired
    if(iactp.eq.1) call actpi
c add actinides if desired
      if(iactin.eq.1) call actini
c ....
c fractionate results if desired
      if(ifrac.eq.1) call fraci
      return
       end
```

```
subroutine gfpi
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine accepts the relative radiological inventory of fission
c products from calculations of origen2.
c array
             afp(i) -relativve inventory of fission products
                       given in units of curies per 10**14 fissions.
c variable acttot - total activity from all radionuclides
c array lookfp(i) - lookup fission product # i in origen2 inventory
c array xnew(i,j) - origen2 inventory isotope j; time i
c array dis(i)
                   - decay constant for origen2 isotope i (sec-1)
c array q(i)
                    - energy per disintegration (watts)
c variable ertfpf - energy rate for fiidos fiss prod inventory
c variable e50fpf - 50 yr cum energy from fiidos fiss prod inventory
c variable ertfpo - energy rate for origen2 fiss prod inventory
c variable e50fpo - 50 yr cum energy from origen2 fiss prod inventory
C ....
c commons from origen2
      INCLUDE 'params.f'
      DIMENSION XNEW(AAAA, BBBB), COEFF(CCCC, BBBB), NPROD(CCCC, BBBB),
     $MMAX(BBBB),KAP(BBBB)
      COMMON /BIG/NUCL(BBBB),Q(BBBB),FG(0004),TOCAP(BBBB),GENNEU(GGGG),
     $ALPHAN(GGGG), SPONF(GGGG), SFNU(GGGG), FISS(GGGG), NUCAB(BBBB),
     $AMPC(BBBB),WMPC(BBBB),XSTORE(JJJJ,BBBB),DIS(BBBB),B(BBBB),
     $ABUND(KKKK), NON0(BBBB), KD(BBBB), LOC(DDDD), NGF(BBBB), NGN(BBBB),
     $NGR(LLLL),GGR(LLLL),AA(DDDD),LOCA(DDDD),NFUDFP(FFFF,0000)
      COMMON /NUDSCR/DUM1(CCCC,BBBB),DUM2(HHHH,BBBB),S(2),CIMN(BBBB)
     $ CSUM(BBBB), NONP(BBBB), NQ(BBBB), XP(BBBB), XPAR(BBBB), XTEMP(BBBB),
     $ D(BBBB),AP(IIII),LOCP(IIII),LONG(BBBB)
      EQUIVALENCE (DUM1(1,1), COEFF(1,1)), (DUM2(1,1), NPROD(1,1)),
     $(NONP(1),MMAX(1)),(KAP(1),NQ(1)),(XNEW(1,1),DUM1(1,1))
      ertfpf=0.
      e50fpf=0.
      do 10 i=1, www
      mmm=lookfp(i)
      value=XSTORE(tmindx+40,mmm)
      afp(i)=value*DIS(mmm)*1.6283e13
      ertfpf=ertfpf+value*Q(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50fpf=e50fpf+value*Q(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
 10
      continue
      ertfpo=0.
      e50fpo=0.
      do 20 mmm=818,1598
      value=XSTORE(tmindx+40,mmm)
      ertfpo=ertfpo+value*Q(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50fpo=e50fpo+value*Q(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
 20
      continue
c calculate total activity
C ....
      acttot=0.0
      do 30 i=1,www
      acttot=acttot+afp(i)
 30
      continue
      return
      end
      blockdata lookdata
      include 'fiparms.f'
      include 'varblock.f'
```

```
data lookfp/
+870,896,904,905,911,919,920,921,928,934,
+935,941,942,946,947,948,956,957,958,959,
+965,966,967,968,974,975,982,983,985,986,
+993,1000,1001,1002,1008,1016,1017,1018,1029,1037,
+1038, 1039, 1052, 1053, 1059, 1060, 1067, 1068, 1069, 1077,
+1083,1084,1085,1086,1087,1093,1094,1103,1122,1124,
+1126,1135,1143,1161,1181,1259,1268,1276,1278,1279,
+1288,1289,1299,1300,1301,1318,1319,1320,1321,1327,
+1328,1331,1338,1339,1340,1341,1342,1346,1347,1348,
+1349,1353,1354,1355,1356,1358,1359,1365,1366,1369,
+1370,1374,1375,1376,1377,1385,1391,1392,1393,1398,
+1399,1406,1407,1411,1412,1413,1418,1419,1420,1425,
+1426,1434,1435,1436,1442,1443,1444,1451,1452,1460,
+1461,1468,1469,1470,1471,1477,1479,1480,1489,1503,
+1504,1513,1522,1530,1539,1545,1569,1597,1599,1600/
data lookap/
+1600, 38,118,124,128, 1600 ,130,132,147,150,
+605,610,613,614,656,657,120, 3*1600/
data lookan/
+738,739,743,753,754,755,757,758,760,765,
+767,768,773,774,775,776,784,793, 2*1600/
```

```
subroutine krxeri
      include 'fiparms.f'
      include 'varblock.f'
c this subroutine removes krypton and xenon (noble gases) from inventory and
c records amount of removed inventory so that gamma energy spectrum can be
c ....
c array afp(i) - amount of radionuclide i determined for time of concern.
c array akrxer(j)- amount of noble gas j removed from inventory
                     at time of concern.
c array noble(j) - radionuclide position corresponding to j th noble gas.
      dimension noble(13)
      data noble/4,7,8,10,12,14,87,96,97,103,104,107,110/
c ....
10 continue
      do 20 j=1,13
      akrxer(j)=afp(noble(j))
      afp(noble(j))=0.0
      acttot=acttot-akrxer(j)
      continue
 20
      return
      end
```

```
subroutine actpi
      include 'fiparms.f'
      include 'varblock.f'
   this subroutine accepts the relative radionuclide inventory
  of activation products from calculations of origen2.
С
                   the twenty radionuclides are:
                     (1) be^{-7}
                                   (2) na-24
                                                (3) mn-54
                                                              (4) fe-55
C
                     (5) fe-59
С
                                   (6) co-57
                                                (7) co-58
                                                              (8) co-60
                     (9) cu-64
                                  (10)cu-67
                                                (11) w-181
                                                              (12) w-185
С
С
                     (13) w-187
                                  (14) w-188
                                               (15)au-198
                                                              (16)au-199
                     (17)pb-203
                                   (18)mn-56
                                                (19)not used (20)not used
C
  array aactp(i) - relative inventory of activation product radionuclides
                      given in units of curie per 10**14 fissions.
С
  array lookap(i) - lookup activation product # i in origen2 inventory
С
  array xnew(i,j) - origen2 inventory isotope j; time i
С
c array dis(i)
                   - decay constant for origen2 isotope i (sec-1)
c array q(i)
                   - energy per disintegration (watts)
  variable ertapf - energy rate for fiidos act prod inventory variable e50apf - 50 yr cum energy from fiidos act prod inventory
  variable ertapo - energy rate for origen2 act prod inventory
c variable e50apo - 50 yr cum energy from origen2 act prod inventory
c ....
c common from origen2
      INCLUDE 'params.f'
      DIMENSION XNEW(AAAA, BBBB), COEFF(CCCC, BBBB), NPROD(CCCC, BBBB),
     $MMAX(BBBB),KAP(BBBB)
      COMMON /BIG/NUCL(BBBB),Q(BBBB),FG(0004),TOCAP(BBBB),GENNEU(GGGG),
     $ALPHAN(GGGG), SPONF(GGGG), SFNU(GGGG), FISS(GGGG), NUCAB(BBBB),
     $AMPC(BBBB),WMPC(BBBB),XSTORE(JJJJ,BBBB),DIS(BBBB),B(BBBB),
     $ABUND(KKKK), NONO(BBBB), KD(BBBB), LOC(DDDD), NGF(BBBB), NGN(BBBB),
     $NGR(LLLL),GGR(LLLL),AA(DDDD),LOCA(DDDD),NFUDFP(FFFF,0000)
      COMMON /NUDSCR/DUM1(CCCC, BBBB), DUM2(HHHH, BBBB), S(2), CIMN(BBBB),
     $ CSUM(BBBB), NONP(BBBB), NQ(BBBB), XP(BBBB), XPAR(BBBB), XTEMP(BBBB),
     $ D(BBBB),AP(IIII),LOCP(IIII),LONG(BBBB)
      EQUIVALENCE (DUM1(1,1), COEFF(1,1)), (DUM2(1,1), NPROD(1,1)),
     $(NONP(1),MMAX(1)),(KAP(1),NQ(1)),(XNEW(1,1),DUM1(1,1))
      ertapf=0.
      e50apf=0.
      do 10^{\circ} i=1,yyy
      mmm=lookap(i)
      value=XSTORE(tmindx+40,mmm)
      aactp(i)=value*DIS(mmm)*1.6283e13
      ertapf=ertapf+value*Q(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50apf=e50apf+value*O(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
10
      continue
      ertapo=0.
      e50apo=0.
      do 20 mmm=1,688
      value=XSTORE(tmindx+40,mmm)
      ertapo=ertapo+value*O(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50apo=e50apo+value*Q(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
 2.0
     continue
c ....
  calculate total activity
      do 30 i=1,yyy
      acttot=acttot+aactp(i)
 30
      continue
      return
      end
```

```
subroutine actini
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine calculates the relative radionuclide inventory of
  actinide elements from calculations of origen2.
С
                the twenty radionuclides are:
                     (1) th-229
                                  (2) th-230
                                                                 (4) u-233
C
                                                  (3) th-234
С
                     (5) u-234
                                   (6) u-235
                                                  (7) u-237
                                                                 (8) u-238
                     (9) u-240
                                                  (11)np-239
                                                                 (12)np-240
                                   (10)np-237
С
С
                     (13)pu-238
                                   (14)pu-239
                                                  (15)pu-240
                                                                 (16)pu-241
                     (17)am-241
                                   (18)cm-242
                                                  (19)not used (20)not used
C
  array aactin(i) - relative inventory of actinide radionuclides given
                     in units of curie per 10**14 fissions.
С
  array lookan(i) - lookup actinide # i in origen2 inventory
С
  array xnew(i,j) - origen2 inventory isotope i; time j
С
c array dis(i)
                  - decay constant for origen2 isotope i (sec-1)
c array q(i)
                   - energy per disintegration (watts)
  variable ertanf - energy rate for fiidos actinide inventory variable e50anf - 50 yr cum energy from fiidos actinide inventory
c variable ertano - energy rate for origen2 actinide inventory
c variable e50ano - 50 yr cum energy from origen2 actinide inventory
c commons from origen2
      INCLUDE 'params.f'
      DIMENSION XNEW(AAAA, BBBB), COEFF(CCCC, BBBB), NPROD(CCCC, BBBB),
     $MMAX(BBBB),KAP(BBBB)
      COMMON /BIG/NUCL(BBBB),Q(BBBB),FG(0004),TOCAP(BBBB),GENNEU(GGGG),
     $ALPHAN(GGGG), SPONF(GGGG), SFNU(GGGG), FISS(GGGG), NUCAB(BBBB),
     $AMPC(BBBB),WMPC(BBBB),XSTORE(JJJJ,BBBB),DIS(BBBB),B(BBBB),
     $ABUND(KKKK), NONO(BBBB), KD(BBBB), LOC(DDDD), NGF(BBBB), NGN(BBBB),
     $NGR(LLLL),GGR(LLLL),AA(DDDD),LOCA(DDDD),NFUDFP(FFFF,0000)
      COMMON /NUDSCR/DUM1(CCCC, BBBB), DUM2(HHHH, BBBB), S(2), CIMN(BBBB),
     $ CSUM(BBBB), NONP(BBBB), NQ(BBBB), XP(BBBB), XPAR(BBBB), XTEMP(BBBB),
     $ D(BBBB),AP(IIII),LOCP(IIII),LONG(BBBB)
      EQUIVALENCE (DUM1(1,1), COEFF(1,1)), (DUM2(1,1), NPROD(1,1)),
     $(NONP(1),MMAX(1)),(KAP(1),NQ(1)),(XNEW(1,1),DUM1(1,1))
      ertanf=0.
      e50anf=0.
      do 10 i=1,xxx
      mmm=lookan(i)
      value=XSTORE(tmindx+40,mmm)
      aactin(i)=value*DIS(mmm)*1.6283e13
      ertanf=ertanf+value*Q(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50anf=e50anf+value*O(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
      continue
10
      ertano=0.
      e50ano=0.
      do 20 mmm=689,817
      value=XSTORE(tmindx+40,mmm)
      ertano=ertano+value*O(mmm)/1.6e-13
      if(DIS(mmm).ne.0)
     $ e50ano=e50ano+value*Q(mmm)/1.6e-13/DIS(mmm)*
     $ (1-exp(-1.*DIS(mmm)*50.*365.*24.*3600.))
 2.0
     continue
c ....
  calculate total activity
      do 30 i=1,xxx
      acttot=acttot+aactin(i)
 30
      continue
      return
      end
```

```
subroutine fraci
      include 'fiparms.f'
      include 'varblock.f'
   this subroutine modifies the relative radionuclide inventory of fission
  products with user supplied fractionation factors.
С
С
                   the one hundred and fifty radionuclides are:
                          (2) br-82
                                         (3) br-83
(8) kr-85m
                                                        (4) kr-83m
           (1)
                se-79
                                                                       (5) br-84
C
С
            (6)
                br-85
                          (7)
                               kr-85
                                                        (9)
                                                             rb-86
                                                                       (10) kr-87
           (11) rb-87
                          (12) kr-88
                                                        (14) kr-89
                                         (13) rb-88
                                                                       (15) rb-89
С
           (16) sr-89
                          (17) rb-90
                                         (18) rb-90m
                                                        (19) sr-90
                                                                       (20) y-90
С
           (21) rb-91
                          (22) sr-91
                                         (23) y-91
                                                        (24) y-91m
                                                                       (25) sr-92
C
           (26) y-92
                          (27) sr-93
                                         (28) y-93
                                                        (29) zr-93
                                                                       (30) nb-93m
C
           (31) y-94
                          (32) y-95
                                         (33) zr-95
                                                        (34) nb-95
С
                                                                       (35) y-96
           (36) zr-97
                                                        (39) nb-98m
                                                                       (40) mo-99
                          (37) nb-97
                                         (38) nb-97m
С
                          (42) tc-99m
С
           (41) tc-99
                                         (43) mo-101
                                                        (44) tc-101
                                                                       (45) mo-102
С
           (46) tc-102
                          (47) tc-103
                                         (48) ru-103
                                                        (49) rh-103m
                                                                      (50) tc-104
                                                                       (55) rh-105m
С
           (51) mo-105
                          (52) tc-105
                                         (53) ru-105
                                                        (54) rh-105
                          (57) rh-106
                                                        (59) rh-109
С
           (56) ru-106
                                         (58) pd-107
                                                                       (60) pd-109
                                                                      (65) cd-115m
С
           (61) ag-109m
                          (62) ag-110m
                                         (63) ag-111
                                                        (64) cd-113m
           (66) sn-123
                          (67) sb-124
                                         (68) sn-125
                                                        (69) sb-125
                                                                       (70) te-125m
C
           (71) sn-126
                          (72) sb-126
                                         (73) sb-127
                                                        (74) te-127
                                                                       (75) te-127m
C
                                                        (79) i-129
           (76) sb-129
                          (77) te-129
                                         (78) te-129m
                                                                       (80) sn-130
С
С
           (81) sb-130m
                          (82) i-130
                                         (83) sb-131
                                                        (84) te-131
                                                                       (85) te-131m
                          (87) \text{ xe-}131\text{m}
                                         (88) sb-132
                                                                      (90) te-132
С
           (86) i-131
                                                        (89) sb-132m
           (91) i-132
                          (92) sb-133
                                         (93) te-133
                                                        (94) te-133m
                                                                       (95) i-133
С
           (96) xe-133
                          (97) \text{ xe}-133\text{m}
                                         (98) te-134
                                                        (99) i-134
                                                                       (100)cs-134
С
           (101)cs-134m (102) i-135
                                         (103)xe-135
                                                        (104)xe-135m
                                                                      (105)cs-135
С
С
           (106)cs-136
                          (107)xe-137
                                         (108)cs-137
                                                        (109)ba-137m
                                                                       (110)xe-138
            (111)cs-138
                          (112)cs-139
                                         (113)ba-139
                                                        (114)cs-140
                                                                       (115)ba-140
С
                          (117)ba-141
           (116)la-140
                                         (118)la-141
                                                        (119)ce-141
                                                                       (120)ba-142
С
С
           (121)la-142
                          (122)la-143
                                         (123)ce-143
                                                        (124)pr-143
                                                                       (125)ce-144
                                                        (129)pr-145
С
            (126)pr-144
                          (127)pr-144m
                                        (128)ce-145
                                                                       (130)ce-146
С
            (131)pr-146
                          (132)ce-147
                                         (133)pr-147
                                                        (134)nd-147
                                                                       (135)pm-147
С
            (136)pr-148
                          (137)pm-148
                                         (138)pm-148m
                                                        (139) pm - 149
                                                                       (140)pm-151
           (141) sm - 151
                          (142)eu-152
                                         (143)sm-153
                                                        (144)eu-154
                                                                       (145)eu-155
С
           (146)eu-156
                          (147)tb-160
                                         (148)ho-166m
                                                       (149)not used (150)not used
С
   array afp(i)
                   - relative radionuclide inventory of fission products in units
                     of curies per 10**14 fissions.
C
С
   array afracc(id(i))-change in the amount of relative radionuclide inventory
                       for the i th fractionated fission product.
С
С
   array id(i)
                   - fission product number for the i th fractionated fission
С
                     product.
c ....
      do 10 i=1,nfrac
      afracc(i)=(ffrac(i)-1.)*afp(id(i))
      afp(id(i)) = afp(id(i)) * ffrac(i)
      acttot=acttot+afracc(i)
      continue
 10
      return
      end
```

```
subroutine rges
       include 'fiparms.f'
       include 'varblock.f'
c calculates the relative radionuclide gamma energy spectrum for the purpose of
c providing data to be used to in subroutine sfcalc.
c .....
c indices for control of inventory treatment are:
c variable ikrxer - index for treatment of noble gases
c variable iactp - index for treatment of activation products
c variable iactin - index for treatment of actinides
c variable ifrac - index for treatment of fractionation of fission products
c 0) no treatment
                                 1) treatment required
c calculate gross fission product gamma spectrum
    call gfpg
c remove krypton and xenon if desired
c .....
if(ikrxer.eq.1) call krxerg
c add activation products if desired
    if(iactp.eq.1) call actpg
c add actinides if desired
      if(iactin.eq.1) call acting
c ....
c fractionate results if desired
      if(ifrac.eq.1) call fracg
      return
      end
```

```
subroutine gfpg
      include 'fiparms.f'
      include 'varblock.f'
c this subroutine accepts the relative radiological gamma energy spectrum
c of fission products from calculations of origen2.
c array spec(j) - relative gamma emission spectrum for energy group j
                    of the fission products
c array gspec(j,k,l)-rel gammma energy spectrum from origen2
                     energy group j; isotope type k; time loc l
c ....
c common from origen2
     common /spectra/ gspec(ooo,3,zzz)
      do 10 j=1,000
      spec(j)=gspec(j,3,tmindx)
10
     continue
c convert from gamma/sec to gamma/hr
      do 20 j=1,000 spec(j)=spec(j)*3600.
 20
      continue
      return
      end
```

```
subroutine krxerg
      include 'fiparms.f'
      include 'varblock.f'
c this subroutine calculates the spectrum produced by krypton and xenon (noble
c gases) and removes it from the relative radionuclide gamma
c spectrum at the time of concern.
c array akrxer(i)- amount of noble gas i removed from inventory
                    at time of concern.
\ensuremath{\mathtt{c}} array gamma(j) - photons per disintegration for each energy group i. read in
С
                    one isotope at a time.
  array spec(j) - relative gamma energy spectrum for energy group j modified
С
С
                    by subtracting the spectrum of the noble gases.
c ....
 10 continue
      open(unit=2,file='krxe.gam',status='old')
 20
      continue
      do 30 j=1,000
      skrxer(j)=0.0
 30
      continue
      do 40 i=1,13
      read(2,*)(gamma(j),j=1,000)
      do 40 j=1,000
      skrxer(j)=skrxer(j)+akrxer(i)*gamma(j)
 40
      continue
      do 50 j=1,000
      skrxer(j)=skrxer(j)*1.332e+14
      spec(j)=spec(j)-skrxer(j)
      continue
      close(unit=2)
      return
      end
```

```
subroutine actpg
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine accepts the gamma energy spectrum of activation products
  from calculations of origen2
  and adds it to the relative radionuclide gamma spectrum at time of concern
                  the twenty radionuclides are:
C
С
                    (1) be-7
                                (2) na-24
                                              (3) mn-54
                                                            (4) fe-55
                                                           (8) co-60
                    (5) fe-59
                                 (6) co-57
                                              (7) co-58
С
С
                    (9) cu-64
                                 (10)cu-67
                                              (11) w-181
                                                           (12) w-185
                    (13) w-187
                                 (14) w-188
С
                                             (15)au-198
                                                           (16)au-199
С
                    (17)pb-203
                                 (18)mn-56
                                              (19)not used (20)not used
С
  array sactp(j) - relative gamma energy spectrum for energy group j
                    of the activation products.
С
  array spec(j) - relative gamma energy spectrum for energy group j which is
С
                    modified by adding spectrum of the activation products.
 array gspec(j,k,l)-rel gammma energy spectrum from origen2
С
                     energy group j; isotope type k; time loc l
С
c common from origen2
      common /spectra/ gspec(ooo,3,zzz)
      do 10 j=1,000
      sactp(j)=gspec(j,1,tmindx)
10
      continue
c convert from gamma/sec to gamma/hr
      do 20 j=1,000
      sactp(j) = sactp(j) *3600.
      spec(j)=spec(j)+sactp(j)
 20
      continue
      return
      end
```

```
subroutine acting
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine accepts the gamma energy spectrum of actinide elements
  from calculations of origen2.
  and adds it to the relative radionuclide gamma spectrum at time of concern
                the twenty radionuclides are:
C
                                (2) th-230
С
                    (1) th-229
                                                (3) th-234
                                                              (4) u-233
                                  (6) u-235
                                                              (8) u-238
                    (5) u-234
                                                (7) u-237
С
С
                    (9) u-240
                                 (10)np-237
                                                (11)np-239
                                                              (12)np-240
                    (13)pu-238
                                 (14)pu-239
                                                (15)pu-240
                                                              (16)pu-241
С
                    (17)am-241
                                 (18)cm-242
                                                (19)not used (20)not used
С
  array sactin(j) - relative gamma energy spectrum for energy group j
                    of the actinides.
С
                   - relative gamma energy spectrum for energy group j which
С
  array spec(j)
                     is modified by adding spectrum of the actinides.
c array gspec(j,k,l)-rel gammma energy spectrum from origen2
                     energy group j; isotope type k; time loc l
c ....
c common from origen2
     common /spectra/ gspec(ooo,3,zzz)
      do 10 j=1,000
      sactin(j)=gspec(j,2,tmindx)
10
     continue
c convert from gamma/sec to gamma/hr
      do 20 j=1,000
      sactin(j)=sactin(j)*3600.
      spec(j)=spec(j)+sactin(j)
 20
      continue
      return
      end
```

```
subroutine fracg
      include 'fiparms.f'
      include 'varblock.f'
   this subroutine modifies the gamma energy spectrum caused by the
  the fractionation of fission products at the time of concern.
c ....
                   the one hundred and fifty radionuclides are:
С
                          (2) br-82
                                         (3) br-83 (8) kr-85m
           (1)
                se-79
                                                        (4) kr-83m
                                                                      (5) br-84
C
С
            (6)
                br-85
                          (7)
                               kr-85
                                         (8)
                                             kr-85m
                                                        (9)
                                                            rb-86
                                                                       (10) kr-87
                                                        (14) kr-89
           (11) rb-87
                          (12) kr-88
                                         (13) rb-88
                                                                      (15) rb-89
С
           (16) sr-89
                          (17) rb-90
                                         (18) rb-90m
                                                        (19) sr-90
                                                                      (20) y-90
С
           (21) rb-91
                          (22) sr-91
                                         (23) y-91
                                                        (24) y-91m
                                                                      (25) sr-92
           (26) y-92
                          (27) sr-93
                                         (28) y-93
                                                        (29) zr-93
                                                                      (30) nb-93m
С
           (31) y-94
                          (32) y-95
                                         (33) zr-95
                                                        (34) nb-95
С
                                                                      (35) y-96
           (36) zr-97
                                                                      (40) mo-99
                          (37) nb-97
                                         (38) nb-97m
                                                        (39) nb-98m
С
С
           (41) tc-99
                          (42) tc-99m
                                         (43) mo-101
                                                        (44) tc-101
                                                                       (45) mo-102
С
           (46) tc-102
                          (47) tc-103
                                         (48) ru-103
                                                        (49) rh-103m
                                                                      (50) tc-104
           (51) mo-105
С
                          (52) tc-105
                                         (53) ru-105
                                                        (54) rh-105
                                                                      (55) rh-105m
                                                        (59) rh-109
С
           (56) ru-106
                          (57) rh-106
                                         (58) pd-107
                                                                       (60) pd-109
                                                                      (65) cd-115m
С
           (61) ag-109m
                         (62) ag-110m
                                         (63) ag-111
                                                        (64) cd-113m
                                         (68) sn-125
           (66) sn-123
                          (67) sb-124
                                                        (69) sb-125
                                                                       (70) te-125m
C
           (71) sn-126
                          (72) sb-126
                                         (73) sb-127
                                                        (74) te-127
                                                                      (75) te-127m
C
                                                       (79) i-129
           (76) sb-129
                          (77) te-129
                                         (78) te-129m
                                                                      (80) sn-130
С
С
           (81) sb-130m
                          (82) i-130
                                         (83) sb-131
                                                        (84) te-131
                                                                       (85) te-131m
                                        (88) sb-132
                                                                      (90) te-132
С
           (86) i-131
                          (87) \text{ xe}-131\text{m}
                                                        (89) \text{ sb-}132m
           (91) i-132
                          (92) sb-133
                                         (93) te-133
                                                        (94) te-133m
                                                                      (95) i-133
С
           (96) xe-133
                          (97) \text{ xe-} 133\text{m}
                                        (98) te-134
                                                        (99) i-134
                                                                       (100)cs-134
С
           (101)cs-134m (102) i-135
                                         (103)xe-135
                                                        (104)xe-135m
                                                                      (105)cs-135
С
С
           (106)cs-136
                          (107)xe-137
                                         (108)cs-137
                                                        (109)ba-137m
                                                                      (110)xe-138
            (111)cs-138
                          (112)cs-139
                                         (113)ba-139
                                                        (114)cs-140
                                                                       (115)ba-140
С
                          (117)ba-141
           (116)la-140
                                         (118)la-141
                                                        (119)ce-141
                                                                      (120)ba-142
С
С
           (121)la-142
                          (122)la-143
                                         (123)ce-143
                                                        (124)pr-143
                                                                      (125)ce-144
С
            (126)pr-144
                          (127)pr-144m (128)ce-145
                                                        (129)pr-145
                                                                       (130)ce-146
С
            (131)pr-146
                          (132)ce-147
                                         (133)pr-147
                                                        (134)nd-147
                                                                       (135)pm-147
С
            (136)pr-148
                          (137)pm-148
                                         (138)pm-148m
                                                        (139)pm-149
                                                                       (140)pm-151
                          (142)eu-152
           (141) sm - 151
                                         (143)sm-153
                                                        (144)eu-154
                                                                      (145)eu-155
C
           (146)eu-156
                         (147)tb-160
                                         (148)ho-166m
                                                       (149)not used (150)not used
С
   array afracc(i)- amount of relative radionuclide inventory for fiss products
                     changed by fractionation.
C
С
   array gamma(j) - photons per disintegration for each energy group j read in
С
                     one isotope at a time.
С
   array spec(j) - relative gamma energy spectrum for energy group j modified
С
                     by change in spectrum from fractionation of fiss products.
С
 10
      continue
      open(unit=2,file='frac.gam',status='old')
      continue
      do 30 j=1,000
      sfracc(j)=0.0
 30
      continue
      do 40 i=1,nfrac
      read(2,*)(gamma(j),j=1,000)
      do 40 j=1,000
      sfracc(j)=sfracc(j)+afracc(i)*gamma(j)
 40
      continue
      do 50 j=1,000
      sfracc(j)=sfracc(j)*1.332e+14
      spec(j)=spec(j)+sfracc(j)
 50
      continue
      close(unit=2)
      return
      end
```

```
subroutine sfcalc
      include 'fiparms.f'
      include 'varblock.f'
  this subroutine calculates the scaling factor that specifies the radiological
  contamination in units of 10**14 fissions per m**2 or m**3.
 variable itrm - index for type of radiological measurement
             the six types of measurement are
C
С
       (1) radiation intensity above contaminated surface
       (2) radiation intensity inside debris cloud
С
       (3) radiation intensity below debris cloud
С
       (4) gross activity - airborne concentration
       (5) gross activity - surface concentration
C
       (6) gross activity - inhalation or ingestion intake
С
                  - relative gamma emission spectrum at time of measurement
С
   array spec(j)
                     (gamma/hr per 10**14 fissions).
С
  variable acttot - total relative activity of radiological material
С
                     (curie per 10**14 fissions).
C
   array xactmes(t)- measured activity of radiological material
С
С
                     (curie, curie per m**2, or curie per m**3) at
                     time index t.
C
                   - gamma radiation exposure factor for surface, in-cloud,
С
  array gref(j)
                     or below-cloud measurement instrument itmi
С
С
                     (r/hr per gamma/hr/m**2).
                   - scaling factor (10*14 fissions per m**2 or m**3)
С
  variable sf
c array xrimes(t) - measured radiation intensity(r/hr)at time index t
10 continue
     if(xitrm(tmindx).gt.3) go to 90
c ....
c xitrm=1,2,3
      if(xitrm(tmindx).eq.1) open(unit=2,file='gref.sur',status='old')
 30
      if(xitrm(tmindx).eq.2) open(unit=2,file='gref.inc',status='old')
      if(xitrm(tmindx).eq.3) open(unit=2,file='gref.blc',status='old')
 40
      continue
      do 50 j=1,xitmi(tmindx)
      read(2,*)(gref(i),i=1,nnn)
      continue
 50
      do 60 i=1,nnn
      gref(i)=gref(i)/1.e+4
 60
      continue
      es=0.0
      do 70 i=1,15
      es=es+spec(i)*gref(nnn+1-i)
 70
      continue
      es=es+ 0.55*spec(16)*gref(6)
      es=es+ 0.45*spec(16)*gref(5)
 80
      continue
      sf=xrimes(tmindx)/es
      close(unit=2)
      go to 110
c xitrm=4,5,6
C
90
      continue
      if(xitrm(tmindx).lt.6.or.xrimes(tmindx).eq.0.) go to 100
c logic for specific activity
      irimes=int(xrimes(tmindx))
      if(irimes.lt.151) r=acttot/afp(irimes)
      if(irimes.gt.150.and.irimes.lt.171) r=acttot/aactp(irimes-150)
      if(irimes.gt.170) r=acttot/aactin(irimes-170)
      sf=r*xactmes(tmindx)/acttot
      go to 110
 100
      continue
      sf=xactmes(tmindx)/acttot
 110 continue
```

return end

```
subroutine dose
      include 'fiparms.f'
      include 'varblock.f'
С
  this subroutine calculates the organ doses contributed by each radionuclide
 and the total organ doses.
                 - breathing rate(m**3/hr) at time t
c array xbr(t)
  array xdur(t) - duration of exposure(hr) at time t
 array xkfac(t) - ratio of airborne to surface at time t
С
c variable sf
                  - scaling factor (10**14 fissions per m**2, if itrm=1,5;
                    10**14 fissions per m**3, if itrm=2,3,4; 10**14 fissions
                    intake, if itrm=6)
C
  array xitdcf(t) - index for type of dose conversion factor(see input)
С
                  - relative amount of fission product radionuclides
С
  array afp(i)
                    (curie per 10**14 fissions)
С
c array aactp(i) - relative amount of activation product radionuclides
                    (curie per 10**14 fissions)
С
  array aactin(i) - relative amount of actinide element radionuclides
С
С
                    (curie per 10**14 fissions)
                  - dose conversion factor(rem/curie)for inhalation or ingestion
c array dcf(i)
                 - dose to organ j for radionuclide i (rem)
c array d(i,j)
c array \ td(i,j) - total \ dose \ to \ organ \ j \ at \ time \ i
С
  variable upfrac- pu239 uptake fraction for ingestion or inhalation
С
                    in curies per curies
c array exfrac(i,j) - pu239 excretion fraction in urine curies per day from
                       exposure i, j years from shot
c array sumfrac(i)-pu239 total excretion for multiple exposures
c array tyrs(i) - times after shot for excretion factors(years)
c ....
c array xitdcf - index for type of dose conversion factor
   (1) inhalation dcf (currently ICRP 72)
    (2) ingestion dcf (currently ICRP 72)
С
     const=xbr(tmindx)*xdur(tmindx)*xkfac(tmindx)*sf
c open DCF files
     if(xitdcf(tmindx).eq.1)
     ; open(unit=2,file='inh.dcf',status='old')
     if(xitdcf(tmindx).eq.2)
     ; open(unit=2,file='ing.dcf',status='old')
C . . . .
c read initial information from DCF file
     read(2,*) numorgans(xitdcf(tmindx)),edosnum(xitdcf(tmindx))
      read(2,1) dcfidinfo(xitdcf(tmindx))
      read(2,2) (orgnames(xitdcf(tmindx),i),
                 i=1,numorgans(xitdcf(tmindx)))
  1
      format(a80)
     format(40a11)
c initialize total dose arrays for current time index
c....
  3 do 10 j=1,sss
       td(tmindx,j)=0.0
       td1(tmindx,j)=0.0
       td2(tmindx,j)=0.0
       td3(tmindx,j)=0.0
       td4(tmindx,j)=0.0
       do 9 i=1,ttt
        osrnd(i,j)=0.0
  9
       continue
10
      continue
c read in dcf set
```

```
c....
      do 70 i=1,ttt
 20
       read(2,*) (dcf(j),j=1,numorgans(xitdcf(tmindx))) ! Read in dcfs
       do 21 j=numorgans(xitdcf(tmindx))+1,sss
        dcf(j)=0.0
 2.1
       continue
c total all doses by radionuclide group (fp,actp,actin) but
c separate doses from alpha emitters from doses from beta+gamma
c emitters in actinide group
       do 69 j=1,sss
        dcf(j)=dcf(j)*1.e+6
        if(i.le.150)then
         osrnd(i,j)=const*afp(i)*dcf(j)
         td1(tmindx,j)=td1(tmindx,j)+osrnd(i,j)
        elseif(i.le.170)then
         osrnd(i,j)=const*aactp(i-150)*dcf(j)
         td2(tmindx,j)=td2(tmindx,j)+osrnd(i,j)
        elseif(i.le.190)then
         osrnd(i,j)=const*aactin(i-170)*dcf(j)
         td3(tmindx,j)=td3(tmindx,j)+(osrnd(i,j)*
                       (1.0-alphaemit(i-170)))
         td4(tmindx,j)=td4(tmindx,j)+(osrnd(i,j)*alphaemit(i-170))
        else
        endif
 69
       continue
 70
      continue
      close(unit=2)
      if (itpm.eq.2)go to 120
 80
      do 81 j=1,sss
       td(tmindx,j)=td1(tmindx,j)+td2(tmindx,j)+td3(tmindx,j)+
                    td4(tmindx,j)
       tddcfsum(xitdcf(tmindx),j)=tddcfsum(xitdcf(tmindx),j)+
                                   td(tmindx,j)
       tddcflsum(xitdcf(tmindx),j)=tddcflsum(xitdcf(tmindx),j)+
                                    td1(tmindx,j)
       tddcf2sum(xitdcf(tmindx),j)=tddcf2sum(xitdcf(tmindx),j)+
                                    td2(tmindx,j)
       tddcf3sum(xitdcf(tmindx),j)=tddcf3sum(xitdcf(tmindx),j)+
                                    td3(tmindx,j)
       tddcf4sum(xitdcf(tmindx),j)=tddcf4sum(xitdcf(tmindx),j)+
                                    td4(tmindx, j)
 81
      continue
      go to 300
 120
      do 121 j=1,sss
      td(tmindx,j)=td1(tmindx,j)+td2(tmindx,j)+td3(tmindx,j)+
                    td4(tmindx,j)
 121 continue
      if(istidx.ne.0)then
       timelog=alog(oldtcnc/tcncnew)
       do 130 j=1,sss
С
        a = 0.0
        if(td(tmindx,j)*tdold(j).ne.0)a=alog(tdold(j)/td(tmindx,j))/
        tdsum(j)=tdsum(j)+td(tmindx,j)/xdur(tmindx)*tcncnew/(1+a)*
          (1.0-(oldtcnc/tcncnew)**(1+a))
С
        a = 0.0
        if(td1(tmindx,j)*td1old(j).ne.0)a=alog(td1old(j)/td1(tmindx,j))/
          timelog
        tdlsum(j)=tdlsum(j)+tdl(tmindx,j)/xdur(tmindx)*tcncnew/(1+a)*
          (1.0-(oldtcnc/tcncnew)**(1+a))
C
        a = 0.0
        if(td2(tmindx,j)*td2old(j).ne.0)a=alog(td2old(j)/td2(tmindx,j))/
```

```
timelog
        td2sum(j)=td2sum(j)+td2(tmindx,j)/xdur(tmindx)*tcncnew/(1+a)*
          (1.0-(oldtcnc/tcncnew)**(1+a))
С
        a = 0.0
        if(td3(tmindx,j)*td3old(j).ne.0)a=alog(td3old(j)/td3(tmindx,j))/
          timelog
        td3sum(j)=td3sum(j)+td3(tmindx,j)/xdur(tmindx)*tcncnew/(1+a)*
          (1.0-(oldtcnc/tcncnew) **(1+a))
С
        if(td4(tmindx,j)*td4old(j).ne.0)a=alog(td4old(j)/td4(tmindx,j))/
          timelog
        td4sum(j)=td4sum(j)+td4(tmindx,j)/xdur(tmindx)*tcncnew/(1+a)*
          (1.0-(oldtcnc/tcncnew)**(1+a))
С
        if(tcncnew.eq.xtexp(isttm+nexp))then
         td(tmindx,j)=tdsum(j)
         td1(tmindx,j)=td1sum(j)
         td2(tmindx,j)=td2sum(j)
         td3(tmindx,j)=td3sum(j)
         td4(tmindx,j)=td4sum(j)
        endif
 130
       continue
      endif
C
      do 140 j=1,sss
       tdold(j)=td(tmindx,j)
       tdlold(j)=tdl(tmindx,j)
       td2old(j)=td2(tmindx,j)
       td3old(j)=td3(tmindx,j)
       td4old(j)=td4(tmindx,j)
 140
      continue
С
      if(tcncnew.eq.xtexp(isttm+nexp))then
 150
       do 151 j=1,sss
        td(tmindx,j)=td1(tmindx,j)+td2(tmindx,j)+td3(tmindx,j)+
                     td4(tmindx,j)
        tddcfsum(xitdcf(tmindx),j)=tddcfsum(xitdcf(tmindx),j)+
                                    td(tmindx,j)
        tddcf1sum(xitdcf(tmindx),j)=tddcf1sum(xitdcf(tmindx),j)+
                                     td1(tmindx,j)
        tddcf2sum(xitdcf(tmindx),j)=tddcf2sum(xitdcf(tmindx),j)+
                                     td2(tmindx,j)
        tddcf3sum(xitdcf(tmindx),j)=tddcf3sum(xitdcf(tmindx),j)+
                                     td3(tmindx,j)
        tddcf4sum(xitdcf(tmindx),j)=tddcf4sum(xitdcf(tmindx),j)+
                                     td4(tmindx,j)
 151
       continue
      endif
 300
     continue
      if(iplut.eq.0) go to 500
C
c implement jones pu239 retention and excretion function
c times are relative to the shot, not to the exposure
С
      if(xitdcf(tmindx).eq.1) then
       upfrac=.05
      else
       upfrac=1.e-5
      endif
С
      a1=4.75e-3
      a2=2.39e-4
      a3=8.55e-5
      a4=1.42e-5
```

```
x1=5.58e-1
      x2=4.42e-2
      x3=3.80e-3
      x4=2.84e-5
      do 400 i=1,nplut
       if(itpm.eq.2.and.istidx.ne.0) then
        t=365.*tyrs(i)-tcncnew/24.
        if(t.lt.0.0) t=0.0
       else
        t=365.*tyrs(i)-xtexp(tmindx)/24.
        if(t.le.0.0) go to 395
       endif
c Calculate basic excretion fraction
       ft=(a1*exp(-x1*t)+a2*exp(-x2*t)+a3*exp(-x3*t)+a4*exp(-x4*t))
       exfrac(tmindx,i)=const*aactin(14)*upfrac*ft
       addnp=const*aactin(11)*2.35/(24360*365)*upfrac*ft
       if(upfrac.eq.0.05) exfrac(tmindx,i)=exfrac(tmindx,i)+2.4*addnp
       if(upfrac.eq.1.e-5) exfrac(tmindx,i)=exfrac(tmindx,i)+100.*addnp
c Adjust excretion if exposure time + duration exceeds measurement time
      if(itpm.eq.1.and.((xtexp(tmindx)+xdur(tmindx))/24.0.gt.365.*
          tyrs(i))) then
        timedif=365.*tyrs(i)-xtexp(tmindx)/24.0
        exfrac(tmindx,i) = exfrac(tmindx,i)/xdur(tmindx)*timedif*24.0
c Handle integrated plutonium intake
       if(itpm.eq.2)then
        if(istidx.ne.0)then
         t=365.*tyrs(i)-oldtcnc/24.
         if(t.lt.0.0) go to 390
         ftold=(a1*exp(-x1*t)+a2*exp(-x2*t)+a3*exp(-x3*t)+a4*exp(-x4*t))
         if((tcncnew/24.0).qt.(365.0*tyrs(i))) then
          timedif=365.0*tyrs(i)-oldtcnc/24.0
         else
          timedif=tcncnew/24.0-oldtcnc/24.0
         endif
С
         a = 0.0
         exfden=max(exfrac(tmindx,i),oldexf(i))
         if(exfden.le.0) go to 390
         if((exfrac(tmindx,i)*oldexf(i).ne.0).and.(abs(exfrac(tmindx,i)
     ;
            -oldexf(i))/exfden.gt.0.001)) then
          a=alog((oldexf(i)/ftold)/(exfrac(tmindx,i)/ft))/timedif
          sumexf(i)=sumexf(i)+exfrac(tmindx,i)/a/xdur(tmindx)*
                    (\exp(a*timedif)-1.0)*24.0
         else
          sumexf(i)=sumexf(i)+(exfrac(tmindx,i)+oldexf(i))/2/
                    xdur(tmindx)*timedif*24
         endif
 390
         if(tcncnew.eq.xtexp(isttm+nexp)) then
          exfrac(tmindx,i)=sumexf(i)
          sumfrac(i)=sumfrac(i)+exfrac(tmindx,i)
         endif
        endif
        oldexf(i) = exfrac(tmindx,i)
c Handle standard plutonium intake
       else
       sumfrac(i)=sumfrac(i)+exfrac(tmindx,i)
       endif
 395
       continue
```

400 continue c 500 return end

```
subroutine outputf
       include 'fiparms.f'
       include 'varblock.f'
       character*2 atorby(2)
       character*7 nucld1(100),nucld2(90)
       data atorby/'at','by'/
       data nucld1/'se-79','br-82','br-83','kr-83m','br-84','br-85',
      ;'kr-85','kr-85m','rb-86','kr-87','rb-87','kr-88','rb-88','kr-89',
;'rb-89','sr-89','rb-90','rb-90m','sr-90',' y-90','rb-91','sr-91',
      ;' y-91',' y-91m','sr-92',' y-92','sr-93',' y-93','zr-93','nb-93m',
      ;' y-94',' y-95','zr-95','nb-95',' y-96','zr-97','nb-97','nb-97m',
;'nb-98m','mo-99','tc-99m','mo-101','tc-101','mo-102',
      ;'tc-102','tc-103','ru-103','rh-103m','tc-104','mo-105','tc-105',
;'ru-105','rh-105','rh-105m','ru-106','rh-106','pd-107','rh-109',
;'pd-109','ag-109m','ag-110m','ag-111','cd-113m','cd-115m',
      ; 'sn-123', 'sb-124', 'sn-125', 'sb-125', 'te-125m', 'sn-126', 'sb-126',
      ; sb-127', te-127', te-127m', sb-129', te-129', te-129m', i-129',
      ;'sn-130','sb-130m',' i-130','sb-131','te-131','te-131m',' i-131',
;'xe-131m','sb-132','sb-132m','te-132',' i-132','sb-133','te-133',
      ;'te-133m',' i-133','xe-133','xe-133m','te-134',' i-134','cs-134'/
      data nucld2/
      ;'cs-134m',' i-135','xe-135','xe-135m','cs-135','cs-136','xe-137',
;'cs-137','ba-137m','xe-138','cs-138','cs-139','ba-139','cs-140',
;'ba-140','la-140','ba-141','la-141','ce-141','ba-142','la-142',
      ;'la-143','ce-143','pr-143','ce-144','pr-144','pr-144m','ce-145',
      ;'pr-145','ce-146','pr-146','ce-147','pr-147','nd-147','pm-147',
      ;'pr-148','pm-148','pm-148m','pm-149','pm-151','sm-151','eu-152',
;'sm-153','eu-154','eu-155','eu-156','tb-160','ho-166m',' ',' ',
      ;'be-7','na-24','mn-54','fe-55','fe-59','co-57','co-58','co-60',
      ;'cu-64','cu-67',' w-181',' w-185',' w-187',' w-188','au-198',
      ; 'au-199', 'pb-203', ' ', ' ', 'th-229', 'th-230', 'th-234', ' u-233'; ' u-234', ' u-235', ' u-237', ' u-238', ' u-240', 'np-237', 'np-239',
      ;'np-240','pu-238','pu-239','pu-240','pu-241','am-241','cm-242',
      ; ' ', ' '/
c print program results based on specified output options
       if(tmindx.le.nexp) then
        write(1,10)xtmeas(xcmeas(tmindx))
       else
        write(1,20)
       endif
       if(tmindx.gt.nexp) go to 450
  10 format(1x//10x, 'time of measurement
                                                       ',1pg12.3,' hours')
  20 format(1x//10x, 'total of all measurements and exposures')
c print gamma spectrum information, if specified by IOUT1
       if(iout1.eq.0) go to 50
       if(xitrm(xcmeas(tmindx)).le.3) write(1,30)
       if(xitrm(xcmeas(tmindx)).le.3) write(1,40)
      ;(i,spec(i)-sactp(i)-sactin(i),sactp(i),sactin(i),spec(i),
      ;skrxer(i),sfracc(i),i=1,000)
  30 format(8x,
      ; 'spec(j)-relative gamma emission spectrum at time of measurement'
      ;/26x,'(gamma/hr per 10**14 fissions)'
      ;//lx,'group # fission product activation product
                                                                       fractionated')
                                                     noble gases
      ;'actinides
                                  total
  40 format(1x, i5, 1pg16.3, 4g18.3, g16.3)
c if activity intake measured, indicate index radionuclide or gross activity
  50 if(xitrm(xcmeas(tmindx)).eq.6.and.xrimes(xcmeas(tmindx)).gt.0)
      ; go to 60
       if(xitrm(xcmeas(tmindx)).ge.4) write(1,90) xactmes(xcmeas(tmindx))
       go to 70
```

```
60 irimes=ifix(xrimes(xcmeas(tmindx)))
      write(1,100) irimes,xactmes(xcmeas(tmindx))
    write(1,80) sf
 80 format(/8x,'sf',7x,
    ;'scaling factor(10**14 fissions [per m**2, m**3])',1pg10.3)
 90 format(//8x'actmes measured gross activity (curies)',1pq26.3)
100 format(//8x'actmes
                           measured activity of radionuclide #',i3,
    ;1pg20.3)
c print relative inventory, if specified by IOUT2
      if(iout2.eq.0.or.itpm.eq.2) go to 300
      write(1,200)(i,i=1,10)
      write(1,210)(j*10-10,(afp(i+j*10-10),i=1,10),j=1,15)
      write(1,210)(j*10-160,(aactp(i+j*10-160),i=1,10),j=16,17)
      write(1,210)(j*10-180,(aactin(i+j*10-180),i=1,10),j=18,19)
      write(1,220) acttot
 200 format(/' inventory of 150 fission products, 20 activation',
     ;' products, 20 actinides (ci/10**14 fissions)'/(10i12))
 210 format(0pi4,1p10g12.3)
220 format(/8x,'acttot
                          total activity(curies/10**14 fissions)',
    ;1pg20.3)
c print isotopic organ doses, if specified by IOUT3
300 if(iout3.eq.0.or.itpm.eq.2) go to 400
      numgroups=int(numorgans(xitdcf(tmindx))/12)
C
      if (numgroups.ge.1) then
       do 301 k=1, numgroups
        if (k.eq.1) then
         write(1,311) (orgnames(xitdcf(tmindx),(k-1)*12+j), j=1,12)
        else
         write(1,313) (orgnames(xitdcf(tmindx),(k-1)*12+j), j=1,12)
        endif
        write(1,312)(i,(osrnd(i,(k-1)*12+j),j=1,12),i=1,150)
        write(1,312)(i-150,(osrnd(i,(k-1)*12+j),j=1,12),i=151,170)
        write(1,312)(i-170,(osrnd(i,(k-1)*12+j),j=1,12),i=171,190)
 301
       continue
      endif
      if (numgroups*12.eq.numorgans(xitdcf(tmindx))) goto 400
С
      if (numgroups.eq.0) then
       write(1,311)(orgnames(xitdcf(tmindx),j),
                    j=1,numorgans(xitdcf(tmindx)))
      else
       write(1,313)(orgnames(xitdcf(tmindx),numgroups*12+j),
                    j=1,(numorgans(xitdcf(tmindx))-(numgroups*12)))
      endif
C
     write(1,312)(i,(osrnd(i,numgroups*12+j),
                    j=1,(numorgans(xitdcf(tmindx))-(numgroups*12))),
                    i=1,150)
      write(1,312)(i-150,(osrnd(i,numgroups*12+j),
     ;
                    j=1,(numorgans(xitdcf(tmindx))-(numgroups*12))),
                    i=151,170)
     write(1,312)(i-170,(osrnd(i,numgroups*12+j),
                    j=1,(numorgans(xitdcf(tmindx))-(numgroups*12))),
                    i=171,190)
      goto 400
 311 format(//19x,'dose commitment in rem from each radionuclide'//
     ;' iso #',1a11,11a12)
 312 format(1x, i3, 1x, 1p12g12.3)
313 format(/' iso #',1a11,11a12)
c print intermediate organ doses, if specified by IOUT4
c ....
```

```
400 if(iout2.eq.0.and.itpm.eq.1)write(1,220)acttot
     write(1,410) atorby(1),xtexp(tmindx),xdur(tmindx)
С
 401
     write(1,411)(orgnames(xitdcf(tmindx),i),td1(tmindx,i),
                  td2(tmindx,i),td3(tmindx,i),td4(tmindx,i),
                  td(tmindx,i),i=1,numorgans(xitdcf(tmindx)))
 410 format(//11x,'total dose commitments in rem for intake ',a2,
    ;' time =',1pg10.3,' hours'/
     ;11x,'with duration time =',1pg10.3,' hours'//10x,
    ;' fission products activation products actinides(g+b) ',
         actinides(a)
                            total')
 411 format(al1,2x,1pg11.3,1pg18.3,1pg19.3,1pg17.3,1pg16.3)
c print relative contribution to eff dose from radionuclide if >1%
      if (edosnum(xitdcf(tmindx)).eq.0) goto 500
 419 write(1,431)
     do 420 i=1,100
      if(osrnd(i,edosnum(xitdcf(tmindx))).gt.
         td(tmindx,edosnum(xitdcf(tmindx)))/100.)
       write(1,432) nucld1(i),osrnd(i,edosnum(xitdcf(tmindx))),
                    100.*osrnd(i,edosnum(xitdcf(tmindx)))/
                    td(tmindx,edosnum(xitdcf(tmindx)))
 420 continue
     do 430 i=101,190
      if(osrnd(i,edosnum(xitdcf(tmindx))).gt.
         td(tmindx,edosnum(xitdcf(tmindx)))/100.)
      write(1,432) nucld2(i-100),osrnd(i,edosnum(xitdcf(tmindx))),
                    100.*osrnd(i,edosnum(xitdcf(tmindx)))/
                    td(tmindx,edosnum(xitdcf(tmindx)))
 430 continue
     go to 500
 431 format(//' radionuclides contributing > 1% to effective dose',
             432 format(1x,a7,1pg13.3,0pf7.1)
C
 450
     write(1,451)
     do 460 j=1,2
      if(tddcfsum(j,numorgans(j)).gt.1e-10) then
        write(1,*) ' '
        write(1,*) ' '
        write(1,*) ' Doses from Specified DCF File'
         write(1,454) dcfidinfo(j)
        write(1,452)
        write(1,453)(orgnames(j,i),tddcf1sum(j,i),tddcf2sum(j,i),
                     tddcf3sum(j,i),tddcf4sum(j,i),tddcfsum(j,i),
     ;
                     i=1,numorgans(j))
      endif
 460 continue
 451 format(//11x,'total dose commitments in rem for all intakes',
     ;' by DCF set')
 452 format(/10x,
    ;' fission products activation products actinides(g+b) ',
    ;' actinides(a)
                            total')
 453 format(a11,2x,1pg11.3,1pg18.3,1pg19.3,1pg17.3,1pg16.3)
454 format(' DCF File Info: ',a80)
c print plutonium excretion information, if specified
 500 if (iplut.eq.0) go to 600
      if (tmindx.gt.nexp) then
      write(1,593)
      else
      if(xitdcf(tmindx).ne.2 .and. xitdcf(tmindx).ne.5 )
      write(1,590)'inhalation',.05
      if(xitdcf(tmindx).eq.2 .or. xitdcf(tmindx).eq.5 )
     ; write(1,590)'ingestion ',1.0e-5
```

```
endif
      write(1,591) (tyrs(i),i=1,nplut)
      if (tmindx.gt.nexp) then
      write(1,592) (sumfrac(i),i=1,nplut)
      else
      write(1,592) (exfrac(tmindx,i),i=1,nplut)
     endif
 590 format(/5x,'pu239 fraction in urine from ',a10,' exposure
     ;' uptake fraction=',1pe9.3)
591 format(/' time after shot (yrs)
                                         ',1p10g10.2)
592 format(/' conc (ci/day) or (ci/1.41)',1p10g10.2)
593 format(/5x,'pu239 fraction in urine from all exposures')
c print table output file, if specified by IOUT5
c NOTE: Table output limited in versions 4.2 and later to alpha emitters
       and gamma plus beta emitters only - no radionuclide groupings
       or bioassay results are provided in the tables. If such data is
       needed, use version 4.1
C
С
 600 if(tmindx.le.nexp.or.iout5.ne.1) go to 700
     open(unit=4,file='fiidost.out',status='unknown')
С
     do 620 k=1,2
       if(tddcfsum(k,numorgans(k)).gt.1e-10) then
       write(4,690) ' alpha emitters ',dcfidinfo(k)
       write(4,691) (orgnames(k,j),j=1,numorgans(k))
        do 613 i=1,nexp
        if(xitdcf(i).eq.k) write(4,694) xtexp(i),(td4(i,j),
                                         j=1,numorgans(k))
 613
       continue
       write(4,690) 'gamma+beta emitters ',dcfidinfo(k)
       write(4,691) (orgnames(k,j),j=1,numorgans(k))
       do 614 i=1,nexp
        if(xitdcf(i).eq.k) write(4,694) xtexp(i),(td(i,j)-td4(i,j),
                                         j=1,numorgans(k))
 614
       continue
      endif
620 continue
C
670 close(unit=4)
680 format(23x, 'FIIDOS Data Tables')
681 format(1x,'Total dose commitments in rem for all intakes',
    ;' by DCF set and type of nuclide (with totals)')
 682 format(/11x,a12,' Doses from Inhalation and/or Ingestion')
683 format(//5x,'Pu239 fraction in urine from all exposures')
684 format(/' time after shot (yrs) ',1p,50(', ',g7.2))
685 format(10x,'
                                         concentrations (ci/day)',
                       exp tm
    ;' or (ci/1.41)')
 686 format(15x,1pg10.4,1p,40(',',g9.2))
687 format(13x,' total
                           ',1p,40(',',g9.2))
 690 format(//19x,'Dose commitment in rem from ',a20,'.',
            /19x,'DCF File Info: ',a80)
691 format(/,2x,'exp tm ',40(', ',a10))
 694 format(1x,1pg10.4,1p,40(',',g11.3))
695 format(1x,' total ',1p,40(',',g11.3))
 700
     continue
      return
      end
```

# **APPENDIX C**

**SAMPLE PROBLEMS** 

#### SAMPLE PROBLEMS

A set of six, small example problems has been devised to illustrate the utility of FIIDOS. The first four problems all address the same radiation exposure scenario, but each problem uses a different type of radiological measurement and the time of the measurement is not necessarily coincident with the time of the exposure. All of the first four scenarios use the ICRP-72 inhalation dose conversion factor table. These are nearly identical to the example problems given in the previous FIIDOS manual, with only minor changes that reflect the effect the incorporation of ORIGEN into FIIDOS has had on the results. The set thus shows the capability of FIIDOS to utilize different types of radiological measurement information. The fifth example problem is used to show the results from the same gross activity intake used in the fourth example problem, but using the ICRP-72 ingestion dose conversion factor table. The last example problem is a complete fission product, activation product, and actinide problem. It also illustrates the Pu-239 excretion calculation.

The radiation exposure scenario addressed by the first four examples involves a 15-minute inhalation exposure to deposited fallout four hours after the detonation. The weapon yield is 10 KT, all from U-235 fast neutron fission. No activation products or actinide elements are considered. The fallout is considered to be depleted of the fission gases krypton and xenon, but no other fractionation effects are considered. The specified breathing rate is 1.2 m³/hr. The airborne activity-surface activity ratio, or resuspension factor is  $10^{-5}$  m<sup>-1</sup>. ICRP-72 inhalation dose conversion factors are used throughout.

The table below shows the radiological measurements used for each example problem.

Problem	Type of Radiological Measurement	Value	Time
One	Radiation Intensity	10.0 R/hr	H+1 Hour
Two	Airborne Activity Concentration	$6.914  \mu \text{Ci/m}^3$	H+1 Hour
Three	Surface Activity Concentration	$0.132 \text{ Ci/m}^2$	H+4 Hour
Four	Inhalation Activity Intake	0.3974 μCi	H+4 Hour

The FIIDOS computer program output for the four example problems is given in Figures C-1 through C-4. All example problems have produced the same calculated organ doses using different types of radiological measurements.

The four example problems produced the same results because the problem input data are consistent. Figure C-5 shows the FIIDOS output from the calculation that was used to develop the consistent input data for the example problem set. The calculation was performed as a multiple exposure problem with exposure times of H+l hour and H+4 hour and a measurement time of H+1 hour. The calculation was keyed to a radiation intensity above a contaminated surface of 10 R/hr at H+1 hour; the radiological measurement for Example Problem 1.

As seen in Figure C-5, at H+1 hour, the radiological contamination scaling factor, is 2.54 x 10<sup>14</sup> fissions/m<sup>2</sup> (carried out to greater precision, actual value is 2.541 x 10<sup>14</sup> fissions/m<sup>2</sup>), and the total activity of the fallout material is 0.272 Ci/10<sup>14</sup> fissions (actual value to greater precision is 0.2721 Ci/10<sup>14</sup> fissions). The gross surface activity is thus 0.6914 Ci/m<sup>2</sup>. With a resuspension factor of 10<sup>-5</sup> m<sup>-1</sup>, the gross airborne activity is 6.914 x 10<sup>-6</sup> Ci/m<sup>3</sup> at H+1 hour, the radiological measurement for Example Problem 2.

As seen in Figure C-5, at H+4 hour, the radiological contamination scaling factor is 2.54 x 10<sup>14</sup> fissions/m<sup>2</sup>, and the total activity of the fallout material is 0.05214 Ci/10<sup>14</sup> fissions. The gross surface activity is thus 0.13247 Ci/m<sup>2</sup> at H+4 hour, the radiological measurement for Example Problem 3 (though only 3 digits of precision are shown).

As given above, at H+4 hour the gross surface activity is  $0.13247 \text{ Ci/m}^2$ . With a resuspension factor of  $10^{-5} \text{ m}^{-1}$ , the gross airborne activity is  $1.3247 \times 10^{-6} \text{ Ci/m}^3$ . For a 0.25-hour exposure with a breathing rate of  $1.2 \text{ m}^3/\text{hr}$ , the gross activity intake is thus  $0.3974 \times 10^{-6} \text{ Ci}$ , the radiological measurement for Example Problem 4.

The input data in Example Problem 4 is convenient for illustrating the effects of assuming different pathways and using different dose conversion factors. Figure C-5 shows the output of Example Problem 5, which is identical to Example Problem 4 except that the mode of intake was changed to ingestion. Table 18 shows the committed organ doses calculated for the intake of  $0.3974~\mu\text{Ci}$  of fission products via ingestion or inhalation using the 11 sets of dose conversion factors that have been incorporated into the various versions of FIIDOS over the years. Currently, only ICRP-72 dose conversion factors are used.

Example Problem 6 shows a full example with all types of radionuclides present. The output is given in Figure C-7. In general, if the problem is concerned with a complete set of fission product inventories, the change in results with the current version of FIIDOS versus the original version is within a few percent. However, the amount of specific isotopes can change significantly. Thus if the problem is governed by either a specific isotope input or an isotope for dose, then more significant changes are possible.

-:-1-1	ELLDOG	fiidos		EM ONE			
		VERSION 4.3 EX					
itpm	problem typ	e s	ingle/integ	grated 1/2	1		
ioutl	print spect	rum	no/yes	0/1	0		
10ut2	print inven	tory	no/yes	0/1	0		
10015	print dose	mediate doses	no/yes	0/1	1		
iout5	print dose	e s: rum tory inventory mediate doses tables	no/yes	0/1	0		
nmeas	number of m	easurement cal			1		
	rad measure				1		
	time of rad		indor nual	ido (i+xm-6)	1.00 10.0		
		ty (itrm=1-3); tis/air/fb/fb-			2		
		asurement (itr		1,2,3,1,3	0.00		
nexp	number of e	xposure calcula +(hr)	ations		1		
					4.00		
		e to measuremen	nt indices	(re-sorted)			
dur	duration (h	r) ata (m**2/bm)			0.250 1.20		
kfac	reguanensio	ate (m**3/hr) n factors (m**	-1)		1.000E-05		
itdcf	dose conver	sion factor se	t index 1/2	2	1		
	activation	products	no/yes	0/1			
	n actinides		no/yes	0/1			
ifrac	noble gases fractionati		no/yes no/yes				
		ioassay	<del>-</del>				
nplut	number of e	ntries for plu	no/yes tonium bios	U/I nssav	1 3		
tyrs	times after	shot for Pu co	onc in urir	ie	50.0	55.0	60.
		fiidos	output				
time	e of measureme	nt 1.00	hours				
sf	scaling fa	ctor(10**14 fi	ssions [per	m**2, m**3]	) 2.54		
actto	total acti	vity(curies/10	**14 fissio	ons)	5.214E-02		
		tments in rem :		at time = 4	.00 hours		
							,
	1.940E-05	activation p	roducts ac	0.00 (g+b)	actinides(a)	) tota 1.9401	
	6.665E-05	0.00		0.00	0.00	6.6651	
	1.655E-05	0.00		0.00	0.00	1.655	
reast	1.577E-05	0.00		0.00	0.00	1.577	
wall	3.192E-04 4.332E-04	0.00		0.00	0.00	3.192	
		0.00		0.00	0.00	4.3321	
	1.109E-03	0.00		0.00	0.00	1.109	
i wall dneys	1.226E-03 1.897E-05	0.00 0.00		0.00	0.00	1.226	
ver.	2.182E-05	0.00		0.00	0.00	2.182	
region	3.062E-03	0.00		0.00	0.00	3.062	
ing	1.066E-03	0.00		0.00	0.00	1.066	
ıscle	2.120E-05	0.00		0.00	0.00	2.1201	
aries	4.477E-05	0.00		0.00	0.00	4.4771	
ncreas	2.386E-05	0.00		0.00	0.00	2.386	
marrow in	5.019E-05 1.308E-05	0.00 0.00		0.00	0.00	5.019 1.308	
leen	1.977E-05	0.00		0.00	0.00	1.977	
stes	1.176E-05	0.00		0.00	0.00	1.176	
ıymus	2.342E-05	0.00		0.00	0.00	2.342	
yroid	3.033E-03	0.00		0.00	0.00	3.0331	
erus	2.950E-05	0.00		0.00	0.00	2.950	
old wall	1.108E-04	0.00		0.00	0.00	1.108	
f dose	5.270E-04	0.00		0.00	0.00	5.270	-04

Figure C-1. Example Problem 1 - Inhalation Intake Based on Radiation Intensity

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             1.861E-05
 sr-91
                           3.5
 sr-92
             2.052E-05
  y-92
             2.930E-05
                           5.6
  y-93
             4.289E-05
                           8.1
                         11.9
 zr-97
             6.272E-05
 mo-99
             1.596E-05
                           3.0
 ru-105
             5.592E-06
                           1.1
             2.292E-05
  i-131
 te-132
             2.524E-05
  i-133
             8.737E-05
  i-134
            1.031E-05
                           2.0
             4.197E-05
                           8.0
  i - 135
             5.746E-06
 ba-139
                           1.1
             2.730E-05
 la-141
 la-142
             1.463E-05
                           2.8
 ce-143
             2.606E-05
                           4.9
 ce-144
             6.025E-06
                           1.1
 pr-145
             1.535E-05
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
            fission products activation products actinides(g+b)
                                                                         actinides(a)
                                                                                           total
1.940E-05
  adrenals
                1.940E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                    0.00
                6.665E-05
                                                                           0.00
  bone surf
                                                         0.00
                                                                                           6.665E-05
                                    0.00
  brain
                1.655E-05
                                                         0.00
                                                                           0.00
                                                                                           1.655E-05
                1.577E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.577E-05
  breast
  st wall
                3.192E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.192E-04
  si wall
                4.332E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.332E-04
  uli wall
lli wall
                                    0.00
                                                                           0.00
                1.109E-03
                                                         0.00
                                                                                           1.109E-03
                1.226E-03
                                    0.00
                                                                           0.00
                                                                                           1.226E-03
                                                         0.00
  kidneys
                1.897E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.897E-05
                2.182E-05
                                                         0.00
                                                                           0.00
                                                                                           2.182E-05
  liver
  et region
                3.062E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.062E-03
  lung
                1.066E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.066E-03
  muscle
                2.120E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.120E-05
                4.477E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.477E-05
  ovaries
                2.386E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.386E-05
  pancreas
                5.019E-05
  r marrow
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.019E-05
  skin
                1.308E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.308E-05
  spleen
                1.977E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.977E-05
                1.176E-05
                                                                                           1.176E-05
  testes
                                    0.00
                                                         0.00
                                                                           0.00
                2.342E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.342E-05
  thymus
  thyroid
                                                                           0.00
                                                                                           3.033E-03
                3.033E-03
                                    0.00
                                                         0.00
  uterus
                2.950E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.950E-05
  ubld wall
                1.108E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.108E-04
  eff dose
                5.270E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.270E-04
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
 end
```

Figure C-1. Example Problem 1 - Inhalation Intake Based on Radiation Intensity (concluded).

	e: FIIDOS V		MPLE PROBLEM T				
itpm iout iout iout iout	problem type 1 print spectr 2 print invent 3 print dose i 4 print interm 5 print dose t	si: um ory nventory ediate doses	ngle/integrate no/yes no/yes no/yes no/yes	0/1 0/1 0/1 0/1 0/1	1 0 0 0		
nmea itrm tmea rime	s number of me rad measurem s time of rad s rad intensit meas index t	asurement calc ent indices measurements y (itrm=1-3);	ulations index nuclide	(itrm=6)	1 4 1.00		
actm	es activity mea	surement (itrm	=4-6)	3/ 4/ 3	6.914E-06		
texp icme dur br kfac	number of ex exposed @ h+ as rad exposure duration (hr breathing ra resuspension f dose convers	<pre>(hr)   to measuremen ) te (m**3/hr) factors (m**-</pre>	t indices (re- 1)	sorted)	1 4.00 1 0.250 1.20 1.000E-05		
iact ikrx	p activation print actinides er noble gases of fractionation	roducts removed n	no/yes no/yes no/yes no/yes	0/1 0/1 0/1 0/1	0 0 1 0		
iplu nplu tyrs	t plutonium bit number of en times after	cassay tries for plute shot for Pu co	no/yes onium bioassay nc in urine	0/1	1 3 50.0	55.0	60.0
		fiidos o	utput				
ti	me of measuremen	1.00	hours				
actm	es measured gr	oss activity (	curies)		6.914E-06		
sf	scaling fac	tor(10**14 fis	sions [per m**	2, m**3])	2.541E-05		
actt	ot total activ	ity(curies/10*	*14 fissions)		5.214E-02		
	otal dose commitments of the duration time			ime = 4.0	0 hours		
	ission products						otal
bone surf	1.940E-10 6.665E-10	0.00	0.0		0.00		40E-10 55E-10
brain	1.655E-10	0.00	0.0	0	0.00	1.6	55E-10
breast	1.577E-10	0.00	0.0		0.00		77E-10
st wall si wall	3.192E-09 4.332E-09	0.00 0.00	0.0		0.00		92E-09 32E-09
uli wall	1.109E-08	0.00	0.0		0.00		09E-08
lli wall	1.226E-08	0.00	0.0		0.00		26E-08
kidneys	1.897E-10	0.00	0.0		0.00		97E-10
liver	2.182E-10	0.00	0.0		0.00		32E-10
et region lung	3.062E-08 1.066E-08	0.00 0.00	0.0		0.00		62E-08 66E-08
muscle	2.120E-10	0.00	0.0		0.00		20E-00
ovaries	4.476E-10	0.00	0.0		0.00		76E-10
pancreas	2.386E-10	0.00	0.0	0	0.00	2.38	86E-10
r marrow	5.019E-10	0.00	0.0		0.00		19E-10
skin	1.308E-10 1.977E-10	0.00	0.0		0.00		08E-10 77E-10
spleen testes	1.97/E-10 1.176E-10	0.00 0.00	0.0		0.00		77E-10 76E-10
thymus	2.342E-10	0.00	0.0		0.00		42E-10
thyroid	3.032E-08	0.00	0.0	0	0.00	3.03	32E-08
uterus	2.950E-10	0.00	0.0		0.00		50E-10
ubld wall eff dose	1.108E-09	0.00	0.0		0.00		08E-09
err dose	5.269E-09	0.00	0.0	U	0.00	5.2	59E-09

Figure C-2. Example Problem 2 - Intake Based on Inhalation of Airborne Activity.

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
 sr-91
             1.861E-10
                           3.5
 sr-92
             2.052E-10
  y-92
            2.930E-10
  y-93
             4.289E-10
                           8.1
                         11.9
 zr-97
             6.271E-10
 mo-99
             1.595E-10
                           3.0
 ru-105
             5.592E-11
                           1.1
             2.292E-10
  i-131
 te-132
             2.524E-10
  i-133
             8.736E-10
  i-134
            1.031E-10
                           2.0
             4.197E-10
                           8.0
  i - 135
             5.745E-11
 ba-139
                           1.1
             2.729E-10
 la-141
 la-142
             1.463E-10
 ce-143
             2.606E-10
                           4.9
 ce-144
             6.024E-11
                           1.1
 pr-145
             1.535E-10
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
            fission products activation products actinides(g+b)
                                                                         actinides(a)
                                                                                           total
1.940E-10
  adrenals
                1.940E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                    0.00
                6.665E-10
                                                                           0.00
  bone surf
                                                         0.00
                                                                                           6.665E-10
                1.655E-10
                                    0.00
                                                                                           1.655E-10
  brain
                                                         0.00
                                                                           0.00
                1.577E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.577E-10
  breast
  st wall
                3.192E-09
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.192E-09
  si wall
                4.332E-09
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           4.332E-09
  uli wall
lli wall
                                    0.00
                                                                           0.00
                1.109E-08
                                                         0.00
                                                                                           1.109E-08
                1.226E-08
                                    0.00
                                                                           0.00
                                                                                           1.226E-08
                                                         0.00
  kidneys
                1.897E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.897E-10
                2.182E-10
                                                         0.00
                                                                           0.00
                                                                                           2.182E-10
  liver
  et region
                3.062E-08
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.062E-08
  lung
                1.066E-08
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.066E-08
  muscle
                2.120E-10
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           2.120E-10
                4.476E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.476E-10
  ovaries
                2.386E-10
                                                                                           2.386E-10
                                    0.00
                                                         0.00
                                                                           0.00
  pancreas
                5.019E-10
                                                                           0.00
                                                                                           5.019E-10
  r marrow
                                    0.00
                                                         0.00
  skin
                1.308E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.308E-10
  spleen
                1.977E-10
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           1.977E-10
                1.176E-10
                                                                                           1.176E-10
                                                                           0.00
  testes
                                    0.00
                                                         0.00
                2.342E-10
                                    0.00
                                                        0.00
                                                                                           2.342E-10
  thymus
  thyroid
                                                                           0.00
                                                                                           3.032E-08
                3.032E-08
                                    0.00
                                                         0.00
  uterus
                2.950E-10
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.950E-10
  ubld wall
                1.108E-09
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.108E-09
  eff dose
                5.269E-09
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.269E-09
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                           55.
                                                     60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
 end
```

Figure C-2. Example Problem 2 - Intake Based on Inhalation of Airborne Activity (concluded).

		fiidos	input				
	FIIDOS V						
itpm	problem type print spectr print invent print dose i print interm print dose t	si	ingle/integra	ted 1/2	1 0		
iout1	print spectr	um	no/yes	0/1	0		
iout2	print invent	ory	no/yes	0/1	0		
iout3	print dose i	nventory	no/yes	0/1	0		
1out4	print interm	ediate doses	no/yes	0/1	1		
10015	print dose t	ables	no/yes	0/1	0		
	number of me				1		
	rad measurem				5		
tmeas	time of rad	measurements			4.00		
rimes	rad intensit	y (itrm=1-3);	index nuclid	e (itrm=6)	0.00		
	meas index t			2/3/4/5	0		
actmes	activity mea	surement (itr	m=4-6)		0.132		
nexp	number of ex	posure calcula	ations		1		
texp	number of ex exposed @ h+	(hr)			4.00		
icmeas	rad exposure	to measuremen	nt indices (r	e-sorted)	1		
dur	duration (hr breathing ra resuspension	)			0.250		
br	breathing ra	te (m**3/hr)			1.20		
kfac	resuspension	factors (m**-	-1)		1.000E-05		
ltaci	dose convers	ion lactor set	t index 1/2		1		
iactp	activation p	roducts	no/yes	0/1	0		
lactin	actinides		no/yes	0/1 0/1	0		
ikrxer	noble gases fractionatio	removed	no/yes no/yes no/yes	0/1	1		
ifrac	fractionatio	n	no/yes	0/1	0		
inlut	plutonium bi	020037	no/weg	0/1	1		
nplut	number of en	tries for plut	tonium bioass	av	3		
tyrs	number of en times after	shot for Pu co	onc in urine	2	50.0	55.0	60.0
		fiidos o	output				
time	of measuremen	t 4.00	hours				
actmes	measured gr	oss activity	(curies)		0.132		
sf	scaling fac	tor(10**14 fis	ssions [per m	**2, m**3])	2.54		
acttot	total activ	ity(curies/10	**14 fissions	)	5.214E-02		
1	1 1		C	to do una di	0.0		
	al dose commit a duration tim			time = 4.	00 hours		
fiss	ion products	activation pr	roducts acti	nides(g+b)	actinides(a)		otal
lrenals	1.940E-05	0.00		.00	0.00		40E-05
ne surf	6.665E-05 1.655E-05	0.00		.00	0.00	6.6	65E-05
	1.655E-05 1.577E-05	0.00		.00	0.00 0.00 0.00 0.00	1.6	55E-05 77E-05
east wall	3 192F=04	0.00 0.00		.00	0.00		92E-04
wall	3.192E-04 4.332E-04	0.00		.00	0.00		32E-04
i wall	1.109E-03	0.00		.00	0.00		09E-03
i wall	1.226E-03	0.00		.00	0.00		26E-03
.dneys	1.897E-05	0.00		.00	0.00	1.8	97E-05
ver	2.182E-05	0.00	0	.00	0.00	2.1	82E-05
region	3.062E-03	0.00		.00	0.00		62E-03
ing	1.066E-03	0.00		.00	0.00		66E-03
scle	2.120E-05	0.00		.00	0.00		20E-05
varies	4.477E-05 2.386E-05	0.00 0.00		.00	0.00 0.00		77E-05 86E-05
ncreas marrow	5.019E-05	0.00		.00	0.00		19E-05
in	1.308E-05	0.00		.00	0.00		08E-05
leen	1.977E-05	0.00		.00	0.00		77E-05
estes	1.176E-05	0.00		.00	0.00		76E-05
ıymus	2.342E-05	0.00	0	.00	0.00	2.3	42E-05
nyroid	3.033E-03	0.00		.00	0.00		33E-03
erus	2.950E-05	0.00		.00	0.00		50E-05
old wall	1.108E-04 5.270E-04	0.00		.00	0.00		08E-04
f dose	J. Z/UE-U4	0.00	U	.00	0.00	5.4	70E-04

Figure C-3. Example Problem 3 - Intake Based on Inhalation of Resuspended Surface Activity.

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             1.861E-05
 sr-91
                           3.5
 sr-92
             2.052E-05
  y-92
             2.930E-05
                           5.6
  y-93
             4.289E-05
                           8.1
                         11.9
 zr-97
             6.272E-05
 mo-99
             1.596E-05
                           3.0
 ru-105
             5.592E-06
                           1.1
             2.292E-05
  i-131
 te-132
             2.524E-05
  i-133
             8.737E-05
  i-134
            1.031E-05
                           2.0
             4.197E-05
                           8.0
  i - 135
             5.746E-06
 ba-139
                           1.1
             2.730E-05
 la-141
 la-142
             1.463E-05
 ce-143
             2.606E-05
                           4.9
 ce-144
             6.025E-06
                           1.1
 pr-145
             1.535E-05
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
            fission products activation products actinides(g+b)
                                                                         actinides(a)
                                                                                           total
1.940E-05
  adrenals
                1.940E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                    0.00
                6.665E-05
                                                                           0.00
  bone surf
                                                         0.00
                                                                                           6.665E-05
                                    0.00
  brain
                1.655E-05
                                                         0.00
                                                                           0.00
                                                                                           1.655E-05
                1.577E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.577E-05
  breast
  st wall
                3.192E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.192E-04
  si wall
                4.332E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.332E-04
  uli wall
lli wall
                                    0.00
                                                                           0.00
                1.109E-03
                                                         0.00
                                                                                           1.109E-03
                1.226E-03
                                    0.00
                                                                           0.00
                                                                                           1.226E-03
                                                         0.00
  kidneys
                1.897E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.897E-05
                2.182E-05
                                                         0.00
                                                                           0.00
                                                                                           2.182E-05
  liver
  et region
                3.062E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.062E-03
  lung
                1.066E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.066E-03
  muscle
                2.120E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.120E-05
                4.477E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.477E-05
  ovaries
                2.386E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.386E-05
  pancreas
                                                                           0.00
  r marrow
                5.019E-05
                                    0.00
                                                         0.00
                                                                                           5.019E-05
  skin
                1.308E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.308E-05
  spleen
                1.977E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.977E-05
                1.176E-05
                                                                                           1.176E-05
                                                                           0.00
  testes
                                    0.00
                                                         0.00
                2.342E-05
                                    0.00
                                                         0.00
                                                                                           2.342E-05
  thymus
  thyroid
                                                                           0.00
                3.033E-03
                                    0.00
                                                         0.00
                                                                                           3.033E-03
  uterus
                2.950E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.950E-05
  ubld wall
                1.108E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.108E-04
  eff dose
                5.270E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.270E-04
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
 end
```

Figure C-3. Example Problem 3 - Intake Based on Inhalation of Resuspended Surface Activity (concluded).

		fiidos	input					
	FIIDOS V							
itpm	problem type print spectr print invent print dose i print interm print dose t	si	ingle/inte	egrated	1/2	1 0		
iout1	print spectr	um	no/yes		0/1	0		
iout2	print invent	ory	no/yes		0/1	0		
10ut3	print dose 1	nventory	no/yes		0/1	0 1		
10ut4	print interm	ediate doses	no/yes		0/1	0		
10003	princ dose c	abies	1107 yes		0/1	U		
nmeas	number of me	asurement cald	culations			1		
	rad measurem					6		
	time of rad					4.00		
rimes	rad intensit	y (itrm=1-3);	index nu	clide (ita	cm=6)			
	meas index t			n 1/2/3/4/	/5	0		
actmes	activity mea	surement (1tr	n=4-6)			3.974E-07		
nexp	number of ex	posure calcula	ations			1		
texp	number of ex exposed @ h+	(hr)	2010110			4.00		
	rad exposure			s (re-sort	ced)	1		
dur	duration (hr	)				1.00		
br	breathing ra	te (m**3/hr)				1.00		
kfac	breathing ra resuspension	factors (m**-	-1)			1.00		
itdcf	dose convers	ion factor set	t index 1	/ 2		1		
inath	agtivation n	woduata	20 /220		0 / 1	0		
iactp	activation p actinides	roducts	no/yes		0/1 0/1	0		
ikrxer	noble gases	removed	no/ves		0/1	1		
ifrac	noble gases fractionatio	n	no/yes no/yes no/yes		0/1			
iplut	plutonium bi	oassay	no/yes		0/1	1		
nplut	number of en times after	tries for plut	tonium bio	oassay		3		
tyrs	times after	shot for Pu co	onc in ur	ine		50.0	55.0	60.0
		fiidos d	output					
time	of measuremen	t 4.00	hours					
			(i )			2 0745 07		
	measured gr					3.974E-07		
sf	scaling fac	tor(10**14 fis	ssions [pe	er m**2, n	n**3])	7.622E-06		
acttot	total activ	ity(curies/10;	**14 fiss:	ions)		5.214E-02		
	al dose commit n duration tim			e at time	= 4.0	0 hours		
fiss	sion products	activation pr	roducts a	actinides	(g+b)	actinides(a)	t	otal
adrenals	1.940E-05	0.00		0.00		0.00		40E-05
oone surf orain	6.665E-05	0.00		0.00		0.00	6.6	65E-05
		0.00		0.00		0.00	1.6	55E-05 77E-05
oreast	1.577E-05	0.00		0.00		0.00 0.00 0.00 0.00		
st wall si wall	3.192E-04 4.222E-04	0.00 0.00		0.00		0.00		92E-04 32E-04
ali wall	1.109E-03	0.00		0.00		0.00		09E-03
lli wall	1.226E-03	0.00		0.00		0.00		26E-03
kidneys	1.897E-05	0.00		0.00		0.00		97E-05
liver	2.182E-05	0.00		0.00		0.00		82E-05
et region	3.062E-03	0.00		0.00		0.00	3.0	62E-03
lung	1.066E-03	0.00		0.00		0.00		66E-03
muscle	2.120E-05	0.00		0.00		0.00		20E-05
ovaries	4.477E-05	0.00		0.00		0.00		77E-05
pancreas r marrow	2.386E-05 5.019E-05	0.00 0.00		0.00		0.00 0.00		86E-05 19E-05
skin	1.308E-05	0.00		0.00		0.00		08E-05
spleen	1.977E-05	0.00		0.00		0.00		77E-05
testes	1.176E-05	0.00		0.00		0.00		76E-05
thymus	2.342E-05	0.00		0.00		0.00	2.3	42E-05
thyroid	3.033E-03	0.00		0.00		0.00	3.0	33E-03
uterus	2.950E-05	0.00		0.00		0.00		50E-05
ubld wall	1.108E-04	0.00		0.00		0.00		08E-04
eff dose	5.270E-04	0.00		0.00		0.00	5.2	70E-04

Figure C-4. Example Problem 4 - Intake Based on Inhalation of Gross Activity.

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             1.861E-05
 sr-91
                           3.5
 sr-92
             2.052E-05
  y-92
            2.930E-05
  y-93
             4.289E-05
                           8.1
                         11.9
 zr-97
             6.272E-05
 mo-99
             1.596E-05
                           3.0
             5.592E-06
 ru-105
                           1.1
             2.292E-05
  i-131
 te-132
             2.524E-05
  i-133
             8.737E-05
  i-134
            1.031E-05
                           2.0
             4.197E-05
                           8.0
  i - 135
             5.746E-06
 ba-139
                           1.1
             2.730E-05
 la-141
 la-142
             1.463E-05
                           2.8
 ce-143
             2.606E-05
                           4.9
 ce-144
             6.025E-06
                           1.1
 pr-145
             1.535E-05
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
            fission products activation products actinides(g+b)
                                                                         actinides(a)
                                                                                           total
1.940E-05
  adrenals
                1.940E-05
                                    0.00
                                                         0.00
                                                                           0.00
                6.665E-05
                                    0.00
  bone surf
                                                         0.00
                                                                           0.00
                                                                                           6.665E-05
                                    0.00
                                                                                           1.655E-05
  brain
                1.655E-05
                                                         0.00
                                                                           0.00
                1.577E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.577E-05
  breast
  st wall
                3.192E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.192E-04
  si wall
                4.332E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.332E-04
  uli wall
lli wall
                                    0.00
                                                                           0.00
                1.109E-03
                                                         0.00
                                                                                           1.109E-03
                                                                           0.00
                1.226E-03
                                    0.00
                                                                                           1.226E-03
                                                         0.00
  kidneys
                1.897E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.897E-05
                2.182E-05
                                                         0.00
                                                                           0.00
                                                                                           2.182E-05
  liver
  et region
                3.062E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.062E-03
  lung
                1.066E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.066E-03
  muscle
                2.120E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.120E-05
                4.477E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.477E-05
  ovaries
                2.386E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.386E-05
  pancreas
  r marrow
                5.019E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.019E-05
  skin
                1.308E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.308E-05
  spleen
                1.977E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.977E-05
                1.176E-05
                                                                                           1.176E-05
  testes
                                    0.00
                                                         0.00
                                                                           0.00
                2.342E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.342E-05
  thymus
  thyroid
                3.033E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.033E-03
  uterus
                2.950E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.950E-05
  ubld wall
                1.108E-04
                                    0.00
                                                                           0.00
                                                                                           1.108E-04
  eff dose
                5.270E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.270E-04
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                           55.
                                                     60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
 end
```

Figure C-4. Example Problem 4 - Intake Based on Inhalation of Gross Activity (concluded).

title:	FIIDOS V	fiidos ERSION 4.3 EXA	input AMPLE PROBLEM BA	SIS			
icut1	problem type print spectr print invent	. SI	ingle/integrated no/yes	1/2 0/1	1 0		
10011	print spectr	uiii	no/yes	0/1 0/1	0		
10ut2	print dose i	nventorv	no/ves	0/1	0		
iout4	print dose i	ediate doses	no/yes	0/1	1		
iout5	print dose t	ory nventory ediate doses ables	no/yes	0/1	0		
		asurement calc	culations		1		
	rad measurem				1		
	time of rad				1.00		
			index nuclide ( nan/fb-man 1/2/3		10.0 2		
		surement (itrm		/4/5	0.00		
nexp	number of ex	posure calcula	ations		2		
texp	exposed @ h+	posure calcula (hr)			1.00	4.00	
			nt indices (re-s	orted)	1	1	
dur	duration (hr					0.250	
br	breathing ra	te (m**3/hr) factors (m**-			1.20	1.20	
kfac	resuspension	factors (m**-	-1)		1.000E-05		
itdcf	dose convers	ion factor set	: index 1/2		1	1	
	activation p	roducts	no/yes	0/1	0		
	actinides		no/yes	0/1	0		
	noble gases		no/yes	0/1	1		
ıirac	fractionatio	n	no/yes	0/1	0		
		oassay			1		
nplut	number of en	tries for plut	conium bioassay		3		
tyrs	times after	shot for Pu co	onc in urine		50.0	55.0	60.
		6113					
		fiidos o	output				
time	of measuremen		output hours				
		t 1.00	-	, m**3])	2.54		
sf	scaling fac	t 1.00 tor(10**14 fis	hours		2.54		
sf acttot tota	scaling fac total activ	t 1.00 tor(10**14 fis	hours ssions [per m**2 **14 fissions) for intake at ti	ı	0.272		
sf acttot tota with	scaling fac total activ al dose commit duration tim	t 1.00 tor(10**14 fis ity(curies/10° ments in rem f e = 0.250	hours ssions [per m**2 **14 fissions) for intake at tirhours	me = 1.0	0.272 0 hours	) tot	al
sf acttot tota with fiss	scaling factorial dose commited duration time	t 1.00 tor(10**14 fis ity(curies/10* ments in rem fie = 0.250 activation pr	hours ssions [per m**2 **14 fissions) for intake at tichours coducts actinide	me = 1.0 $es(g+b)$	0.272 hours		
sf acttot tota with fiss	scaling fac total activ al dose commit duration tim	t 1.00 tor(10**14 fis ity(curies/10° ments in rem f e = 0.250	hours ssions [per m**2 **14 fissions) for intake at tirhours	me = 1.0 $es(g+b)$	0.272 0 hours	) tot 4.360 1.129	E-05
sf acttot tota with fiss enals e surf	scaling factorial dose commit duration times:  1. tion products 4.360E-05	t 1.00 tor(10**14 fis ity(curies/10* ments in rem fie = 0.250 activation processors	hours ssions [per m**2 **14 fissions) For intake at tinhours roducts actinid 0.00	me = 1.0 $es(g+b)$	hours  actinides(a)	4.360	E-05 E-04
sf acttot tota with fiss enals e surf in	scaling factor total activated dose commit duration times to products 4.360E-05 1.129E-04	t 1.00 tor(10**14 fis ity(curies/10* ments in rem fie = 0.250 activation pr 0.00 0.00	hours ssions [per m**2 **14 fissions) For intake at tinhours coducts actinid 0.00 0.00	me = 1.00 es(g+b)	0.272 hours actinides(a) 0.00 0.00	4.360 1.129	E-0! E-0! E-0!
sf acttot tota with fiss enals e surf in ast wall	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation production p	hours ssions (per m**2 **14 fissions)  For intake at tinhours coducts actinid 0.00 0.00 0.00 0.00 0.00	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00	4.360 1.129 3.869	E-05 E-05 E-05
sf acttot tota with fiss enals e surf in ast wall	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours coducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00	me = 1.00 es(g+b)	0.272 hours actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00	4.360 1.129 3.869 3.454 9.737 7.640	E-05 E-05 E-05 E-05 E-06
sf acttot  tota with fiss enals e surf in ast wall wall	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation process 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	hours ssions [per m**2 **14 fissions) For intake at tinhours coducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607	E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem file = 0.250  activation process 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	hours ssions [per m**2 **14 fissions)  For intake at time hours  roducts actinide 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607	E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot tota with fiss enals e surf in ast wall wall wall heys	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions (per m**2 **14 fissions) For intake at tinhours coducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317	E-05 E-05 E-05 E-06 E-06 E-06 E-06 E-05 E-05
sf acttot tota with fiss enals e surf in ast wall wall wall neys er	scaling fac total activ al dose commit duration tim dion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at time hours roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592	E-05 E-05 E-05 E-04 E-04 E-05 E-05 E-05 E-05
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region	scaling fac total activ al dose commit duration tim dion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g	scaling fac total activ al dose commit duration tim dion products 4.360E-05 1.129E-04 3.869E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at time hours  roducts actinide 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g cle	scaling fac total activ al dose commit duration tim dion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g cle ries	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.517E-05 8.817E-03 1.648E-03 4.773E-05 8.396E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at time hours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall region g cle ries creas	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.396E-05 6.603E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at time hours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g cle ries ccreas arrow	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.396E-05 6.603E-05 9.222E-05	t 1.00  tor(10**14 fis  ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at time hours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g cle ries creas aarrow n	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.396E-05 6.603E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall neys er region g cle ries creas arrow n een	scaling fac total activ al dose commit duration tim direction tim direction products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.57E-05 8.817E-05 8.817E-03 1.648E-03 4.773E-05 8.817E-05 8.817E-05 8.817E-05 9.222E-05 8.96E-05 9.222E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222 2.965	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall region g cle region g cle ries creas arrow n een tes	scaling fac total activ  1 dose commit duration tim 1 dose-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.517E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.396E-05 6.603E-05 9.222E-05 9.265E-05 5.161E-05	t 1.00  tor(10**14 fistity(curies/10*  ments in rem file = 0.250  activation process of the color of the colo	hours ssions [per m**2 **14 fissions)  For intake at tinhours  coducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222 2.965 5.161	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall region g cle region g cle ries creas arrow n een tes	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.817E-05 8.817E-05 4.592E-05 5.603E-05 5.603E-05 5.2965E-05 5.161E-05 2.422E-05	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours  roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222 2.965 5.161 2.422	E-0! E-0! E-0! E-0! E-0! E-0! E-0! E-0!
sf acttot  tota with fiss enals e surf in ast wall wall wall wall neys er region g cle ries creas arrow n een tes mus roid rus	scaling fac total activ  1 dose commit duration tim 1 dose-05 1 129E-04 3 869E-05 3 .454E-05 9 .737E-04 7 .640E-04 1 .607E-03 1 .536E-03 4 .517E-05 4 .592E-05 8 .817E-03 1 .648E-03 4 .773E-05 8 .396E-05 6 .603E-05 9 .222E-05 2 .965E-05 5 .161E-05 2 .422E-05 5 .304E-05 5 .304E-05 5 .304E-05 6 .603E-03 6 .189E-05	t 1.00  tor(10**14 fistify(curies/10*)  ments in rem file = 0.250  activation process of the color of the col	hours ssions [per m**2 **14 fissions)  For intake at tinhours  coducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222 2.965 5.161 2.422 5.304 3.066 6.189	E-09 E-09 E-09 E-09 E-09 E-09 E-09 E-09
sf acttot  tota with fiss enals e surf in ast wall wall wall neys er region g cle ries creas arrow n een tes mus roid rus d wall	scaling fac total activ al dose commit duration tim sion products 4.360E-05 1.129E-04 3.869E-05 3.454E-05 9.737E-04 7.640E-04 1.607E-03 1.536E-03 4.317E-05 4.592E-05 8.817E-03 1.648E-03 4.773E-05 8.817E-05 6.603E-05 9.222E-05 2.965E-05 5.161E-05 2.422E-05 5.304E-05 3.066E-03	t 1.00  tor(10**14 fis ity(curies/10*  ments in rem fie = 0.250  activation pr 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	hours ssions [per m**2 **14 fissions)  For intake at tinhours roducts actinid 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	me = 1.00	0.272  hours  actinides(a) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	4.360 1.129 3.869 3.454 9.737 7.640 1.607 1.536 4.317 4.592 8.817 1.648 4.773 8.396 6.603 9.222 2.965 5.161 2.422 5.304 3.066	E-05-E-05-E-05-E-05-E-05-E-05-E-05-E-05

Figure C-5. Basis for Example Problem Set Input.

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             2.315E-05
 sr-91
                          2.6
 sr-92
             4.421E-05
  y-92
             1.442E-05
  y-93
             5.249E-05
                          6.0
  y-94
             1.583E-05
                          1.8
 zr-97
             7.093E-05
                           8.1
 mo-99
             1.647E-05
                          1.9
             1.087E-05
 tc-101
 ru-105
             8.887E-06
 sb-131
             1.284E-05
                          1.5
 te-131
            1.408E-05
                          1.6
             1.211E-05
                          1.4
  i-131
 te-132
             2.592E-05
                           2.9
             3.572E-05
 te-133m
                           4.1
  i-133
             7.165E-05
 te-134
             5.471E-05
                          4.7
  i-134
            4.167E-05
5.760E-05
  i-135
             3.145E-05
                           3.6
 cs-138
 ba-139
             2.461E-05
             1.041E-05
 la-141
             4.065E-05
 la-142
             5.577E-05
                           6.3
             2.624E-05
                           3.0
 ce-143
pr-145
             2.173E-05
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                     60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          time of measurement
                                      1.00
                                                hours
                  scaling factor(10**14 fissions [per m**2, m**3]) 2.54
        sf
                  total activity(curies/10**14 fissions)
                                                                      5.214E-02
        acttot
            total dose commitments in rem for intake at time = 4.00
                                                                             hours
            with duration time = 0.250
                                            hours
            fission products activation products actinides(g+b)
                                                                        actinides(a)
                                                                                             total
  adrenals
                1.940E-05
                                    0.00
                                                                           0.00
                                                                                           1.940E-05
                                                         0.00
                6.665E-05
                                    0.00
                                                         0.00
                                                                           0.00
  bone surf
  brain
                1.655E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           1.655E-05
  breast
                1.577E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           1.577E-05
                3.192E-04
                                                        0.00
  st wall
                                    0.00
                                                                           0.00
                                                                                           3.192E-04
  si wall
                4.332E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.332E-04
  uli wall
                1.109E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.109E-03
                1.226E-03
                                                                           0.00
  lli wall
                                    0.00
                                                         0.00
                                                                                           1.226E-03
  kidneys
                1.897E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.897E-05
  liver
                2.182E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           2.182E-05
  et region
                                                                           0.00
                3.062E-03
                                    0.00
                                                         0.00
                                                                                           3.062E-03
                1.066E-03
                                                                                           1.066E-03
                                    0.00
                                                        0.00
  lung
  muscle
                2.120E-05
                                                                           0.00
                                                                                           2.120E-05
                                    0.00
                                                         0.00
                4.477E-05
                                                                           0.00
                                                                                           4.477E-05
  ovaries
                                    0.00
                                                         0.00
  pancreas
                2.386E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.386E-05
  r marrow
                5.019E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           5.019E-05
  skin
                1.308E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           1.308E-05
                1.977E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.977E-05
  spleen
                                                                           0.00
                1.176E-05
                                    0.00
                                                        0.00
                                                                                           1.176E-05
  testes
  thymus
                2.342E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.342E-05
  thyroid
                3.033E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           3.033E-03
  uterus
                2.950E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.950E-05
  ubld wall
                1.108E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.108E-04
  eff dose
                5.270E-04
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           5.270E-04
```

Figure C-5. Basis for Example Problem Set Input (continued).

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             1.861E-05
 sr-91
                           3.5
 sr-92
             2.052E-05
  y-92
            2.930E-05
                           5.6
  y-93
             4.289E-05
                           8.1
                          11.9
 zr-97
             6.272E-05
 mo-99
             1.596E-05
                           3.0
 ru-105
             5.592E-06
                           1.1
             2.292E-05
  i-131
 te-132
             2.524E-05
  i-133
             8.737E-05
                          16.6
  i-134
            1.031E-05
                           2.0
             4.197E-05
                           8.0
  i - 135
             5.746E-06
 ba-139
                           1.1
             2.730E-05
 la-141
 la-142
             1.463E-05
                           2.8
 ce-143
             2.606E-05
                           4.9
 ce-144
             6.025E-06
                           1.1
pr-145
             1.535E-05
     pu239 fraction in urine from inhalation exposure
                                                                uptake fraction=5.000E-02
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
            fission products activation products actinides(g+b)
                                                                         actinides(a)
                                                                                           total
6.300E-05
                6.300E-05
  adrenals
                                    0.00
                                                         0.00
                                                                           0.00
                                    0.00
                1.796E-04
                                                                           0.00
                                                                                           1.796E-04
  bone surf
                                                         0.00
                                     0.00
  brain
                5.524E-05
                                                         0.00
                                                                           0.00
                                                                                           5.524E-05
                5.031E-05
                                     0.00
                                                         0.00
                                                                           0.00
                                                                                           5.031E-05
  breast
  st wall
                1.293E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.293E-03
  si wall
                1.197E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.197E-03
                2.716E-03
2.762E-03
                                                                                           2.716E-03
  uli wall
lli wall
                                    0.00
                                                                           0.00
                                                         0.00
                                    0.00
                                                                           0.00
                                                                                           2.762E-03
                                                         0.00
  kidneys
                6.214E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           6.214E-05
                6.774E-05
                                                         0.00
                                                                           0.00
                                                                                           6.774E-05
  liver
  et region
                1.188E-02
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.188E-02
  lung
                2.715E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           2.715E-03
  muscle
                6.893E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           6.893E-05
                1.287E-04
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.287E-04
  ovaries
                8.989E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           8.989E-05
  pancreas
                1.424E-04
                                                                           0.00
  r marrow
                                     0.00
                                                         0.00
                                                                                           1.424E-04
  skin
                4.273E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           4.273E-05
  spleen
                7.139E-05
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           7.139E-05
                                                                           0.00
  testes
                3.599E-05
                                    0.00
                                                         0.00
                                                                                           3.599E-05
                7.646E-05
                                    0.00
                                                         0.00
                                                                                           7.646E-05
  thymus
  thyroid
                6.099E-03
                                    0.00
                                                                           0.00
                                                                                           6.099E-03
                                                         0.00
                9.139E-05
                                                                           0.00
                                                                                           9.139E-05
  uterus
                                     0.00
                                                         0.00
  ubld wall
                2.965E-04
                                     0.00
                                                         0.00
                                                                           0.00
                                                                                           2.965E-04
  eff dose
                1.407E-03
                                    0.00
                                                         0.00
                                                                           0.00
                                                                                           1.407E-03
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                           55.
                                                      60.
 conc (ci/day) or (ci/1.41)
                                0.0
                                           0.0
                                                     0.0
 end
```

Figure C-5. Basis for Example Problem Set Input (concluded).

	FIIDOS VERS		PROBLEM FIVE			
itom	problem type print spectrum print inventory print dose inve print intermedi print dose tabl	ginale	/integrated		1 0 0 0	
iout5	print dose tabl	es no	/yes	0/1	0	
itrm tmeas rimes itmi	time of rad mea rad intensity (	<pre>indices surements itrm=1-3); inde air/fb/fb-man/f</pre>	x nuclide (it b-man 1/2/3/4		1 6 4.00 0.00 0 3.974E-07	
icmeas dur br kfac	number of exposexposed @ h+(hr rad exposure to duration (hr) breathing rate resuspension fa dose conversion	) measurement in (m**3/hr) ctors (m**-1)	dices (re-sor	ted)	1 4.00 1 1.00 1.00 1.00	
iactin ikrxer	activation prod actinides noble gases rem fractionation	oved no	o/yes o/yes o/yes o/yes	0/1 0/1 0/1 0/1	0 0 1 0	
nplut	plutonium bioas number of entri times after sho	es for plutoniu	m bioassay	0/1	1 3 50.0	55.0 60.0
		fiidos outpu	ıt			
time	of measurement	4.00 h	ours			
actmes	measured gross	activity (curi	es)	3	3.974E-07	
sf	scaling factor	(10**14 fission	s [per m**2,	m**3]) 7	7.622E-06	
acttot	total activity	(curies/10**14	fissions)	5	5.214E-02	
	al dose commitmen n duration time =			= 4.00	) hours	
	sion products ac					
adrenals bone surf	6.645E-05	0.00	0.00 0.00		0.00 0.00	3.017E-05 6.645E-05
	1.508E-05	0.00	0.00		0.00	1.508E-05
	1.618E-05 1.050E-03	0.00	0.00 0.00		0.00 0.00	1.618E-05 1.050E-03
	1.227E-03	0.00	0.00		0.00	1.227E-03
uli wall	3.019E-03	0.00	0.00		0.00	3.019E-03
	3.164E-03 7.360E-05	0.00	0.00 0.00		0.00	3.164E-03 7.360E-05
kidneys liver	6.117E-05	0.00	0.00		0.00	6.117E-05
et region	1.655E-05	0.00	0.00		0.00	1.655E-05
lung	2.007E-05	0.00	0.00		0.00	2.007E-05
muscle ovaries	2.953E-05 1.102E-04	0.00	0.00 0.00		0.00 0.00	2.953E-05 1.102E-04
pancreas	5.406E-05	0.00	0.00		0.00	5.406E-05
r marrow	5.793E-05	0.00	0.00		0.00	5.793E-05
skin spleen	1.813E-05 4.002E-05	0.00	0.00 0.00		0.00 0.00	1.813E-05 4.002E-05
testes	2.250E-05	0.00	0.00		0.00	2.250E-05
thymus	1.865E-05	0.00	0.00		0.00	1.865E-05
thyroid	6.294E-03	0.00	0.00		0.00	6.294E-03
uterus ubld wall	6.994E-05 2.031E-04	0.00	0.00 0.00		0.00 0.00	6.994E-05 2.031E-04
eff dose	8.608E-04	0.00	0.00		0.00	8.608E-04

Figure C-6. Example Problem 5 - Intake Based on Ingestion of Gross Activity.

```
radionuclides contributing > 1% to effective dose equivalent
 nuclide
               rem
                        percent
             4.311E-05
 sr-91
                          5.0
 sr-92
             4.869E-05
  y-92
             4.997E-05
                          5.8
  y-93
            8.115E-05
                          9.4
                         10.7
 zr-97
            9.250E-05
            4.533E-05
  i-131
                          5.3
            3.206E-05
 te-132
            1.777E-04
  i-134
            1.421E-05
  i-135
            8.533E-05
                          9.9
ba-139
            1.259E-05
                          1.5
            4.234E-05
                           4.9
 la-141
            1.774E-05
 la-142
                           2.1
 ce-143
            2.651E-05
 pr-145
     pu239 fraction in urine from ingestion exposure
                                                                uptake fraction=1.000E-05
 time after shot (yrs)
                                50.
                                          55.
                                                     60.
 conc (ci/day) or (ci/1.41)
                                                     0.0
          total of all measurements and exposures
            total dose commitments in rem for all intakes by DCF set
  Doses from Specified DCF File
 DCF File Info: ICRP-72 Ingestion DCFs (From FGR-13) - 5-24-2001
           fission products activation products actinides(g+b)
                                                                        actinides(a)
                                                                                             total
  adrenals
                3.017E-05
                                    0.00
                                                         0.00
                                                                                           3.017E-05
  bone surf
                6.645E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           6.645E-05
  brain
                1.508E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                          1.508E-05
                1.618E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                          1.618E-05
  breast
  st wall
                1.050E-03
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                          1.050E-03
  si wall
                1.227E-03
                                                                           0.00
                                                                                          1.227E-03
                                    0.00
                                                        0.00
  uli wall
                3.019E-03
                                                        0.00
                                                                           0.00
                                                                                           3.019E-03
  lli wall
                3.164E-03
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           3.164E-03
  kidneys
                7.360E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           7.360E-05
                                    0.00
                                                                           0.00
  liver
                6.117E-05
                                                        0.00
                                                                                           6.117E-05
                                    0.00
                                                                          0.00
  et region
                1.655E-05
                                                                                          1.655E-05
                                                        0.00
                2.007E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           2.007E-05
  lung
  muscle
                2.953E-05
                                                         0.00
                                                                           0.00
                                                                                           2.953E-05
  ovaries
                1.102E-04
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           1.102E-04
                5.406E-05
5.793E-05
  pancreas
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           5.406E-05
                                                                                           5.793E-05
  r marrow
                                    0.00
                                                        0.00
                                                                          0.00
  skin
                1.813E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                          1.813E-05
  spleen
                4.002E-05
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           4.002E-05
                2.250E-05
                                                                           0.00
  testes
                                                        0.00
                                                                                           2.250E-05
  thymus
                1.865E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                          1.865E-05
  thyroid
                6.294E-03
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           6.294E-03
  uterus
                6.994E-05
                                    0.00
                                                        0.00
                                                                          0.00
                                                                                           6.994E-05
  ubld wall
                2.031E-04
                                    0.00
                                                        0.00
                                                                           0.00
                                                                                           2.031E-04
  eff dose
                                    0.00
                                                                           0.00
                                                                                           8.608E-04
                8.608E-04
                                                        0.00
     pu239 fraction in urine from all exposures
 time after shot (yrs)
                                50.
                                          55.
                                                     60.
 conc (ci/day) or (ci/1.41)
                                                     0.0
                                0.0
                                          0.0
```

Figure C-6. Example Problem 5 - Intake Based on Ingestion of Gross Activity (concluded).

Table C-1 Organ dose commitments calculated using different sets of dose conversion factors

**FIIDOS** Ingestion Inhalation Inhalation Small Particles Large Particles Opt. Size TM-190 ICRP-30 FGR-11 ICRP-72 TM-190 ICRP-30 FGR-11 TM-190 ICRP-30 FGR-11 ICRP-72 3.31E-5 2.92E-5 3.02E-5 3.71E-5 2.63E-5 4.53E-5 3.23E-5 \_ 1.94E-5 adrenals 2.89E-5 4.25E-5 2.60E-5 4.78E-5 6.09E-5 5.68E-5 8.48E-5 6.67E-5 bone surf 6.65E-5 4.52E-5 6.50E-5 1.66E-5 1.51E-5 brain \_ 2.47E-5 1.62E-5 1.71E-5 2.30E-5 1.58E-5 breast 1.05E-3 st wall 1.03E-3 1.04E-3 1.50E-4 1.66E-4 3.34E-4 4.05E-4 \_ 3.19E-4 si wall 1.39E-3 1.25E-3 1.23E-3 2.17E-4 2.22E-4 4.82E-4 5.30E-4 4.33E-4 uli wall 3.01E-3 2.95E-3 3.02E-3 5.58E-4 5.84E-4 1.29E-3 1.40E-3 1.11E-3 3.06E-3 3.06E-3 3.16E-3 7.21E-4 7.37E-4 1.68E-3 1.73E-3 1.23E-3 lli wall. 9.07E-5 6.49E-5 7.36E-5 4.11E-5 2.24E-5 6.12E-5 3.55E-5 1.90E-5 kidneys 1.08E-4 6.09E-5 6.12E-5 5.89E-5 3.64E-5 7.46E-5 5.16E-5 2.18E-5 liver 1.66E-5 3.06E-3 et region lung 4.76E-5 2.08E-5 1.57E-5 2.01E-5 2.04E-3 1.34E-3 1.52E-3 1.22E-3 2.31E-5 5.40E-4 1.07E-3 2.95E-5 2.12E-5 muscle ovaries 9.71E-5 1.10E-4 2.80E-5 2.02E-5 4.48E-5 pancreas 5.41E-5 5.60E-5 5.41E-5 4.23E-5 2.88E-5 5.78E-5 4.01E-5 2.39E-5 4.25E-5 5.64E-5 6.60E-5 r marrow 4.14E-5 4.61E-5 3.37E-5 5.79E-5 4.25E-5 2.85E-5 4.19E-5 5.02E-5 skin 1.81E-5 1.31E-5 4.14E-5 4.08E-5 4.00E-5 3.76E-5 2.83E-5 5.06E-5 3.78E-5 spleen 1.98E-5 2.40E-5 2.15E-5 9.71E-5 2.25E-5 2.06E-5 1.54E-5 3.38E-5 2.69E-5 testes 2.80E-5 2.02E-5 1.18E-5 3.52E-5 2.12E-5 5.32E-5 3.07E-5 5.32E-5 2.83E-5 2.34E-5 thymus 1.87E-5 1.25E-2 7.29E-3 7.29E-3 6.29E-3 6.34E-3 4.18E-3 1.18E-2 7.51E-3 7.42E-3 3.03E-3 thyroid 4.17E-3 uterus 6.99E-5 2.95E-5 ubld wall 3.88E-5 3.90E-5 2.03E-4 1.92E-5 1.96E-5 3.50E-5 3.68E-5 1.11E-4 2.57E-5 5.10E-5 6.60E-5 bone 4.76E-5 4.07E-3 1.33E-3 res lymp y marrow 2.78E-5 2.88E-5 4.55E-5 remainder 1.79E-3 3.77E-4 8.31E-4

6.27E-5

4.03E-4

\_

4.34E-4

8.41E-5

4.93E-4

5.44E-4

5.27E-4

Organ Dose Commitments (rem) - Example Problem 4

6.56E-5

\_

7.92E-4

8.61E-4

7.39E-4

tbody

eff dose

<sup>- =</sup> Not considered in dose factor set

	title:	RESIDENCE ISI	fiidos		EXAMPLE PR	OBLEM SIX				
	itpm	problem type print spectrum print inventor print dose inv print intermed	si	ingle/integra	ted 1/2	1				
	iout1	print spectrum	1	no/yes	0/1	0 1				
	iout3	print dose inv	·y zentorv	no/ves	0/1	0				
	iout4	print intermed	diate doses	no/yes	0/1	1				
	iout5	print dose tak	oles	no/yes	0/1	0				
						1				
	nmeas itrm	number of meas rad measuremer		culations		1				
	tmeas	time of rad me				16.0				
	rimes	rad intensity	(itrm=1-3);	index nuclid	e (itrm=6)	1.00				
	itmi	meas index tis			2/3/4/5	2				
	actmes	activity measu	ırement (itr	n=4-6)		0.00				
	nexp	number of expo	sure calcula	ations		1				
	texp	exposed @ h+(h				16.0				
		rad exposure t	o measuremen	nt indices (r	e-sorted)	1				
	dur	duration (hr)	( ++2 (1 )			1.00				
	br kfac	breathing rate resuspension f		_1 )		1.20 6.000E-0	16			
	itdcf	dose conversion				1	00			
				, -						
	iactp	activation pro	ducts	no/yes	0/1	1				
		actinides		no/yes no/yes no/yes	0/1	1				
	ifrac	noble gases re fractionation	emovea	no/yes no/yes	0/1 0/1	1 0				
	IIIac	rraccionacion		1107 yes	0/1	Ü				
	iplut					1				
	nplut	number of entr	ries for plut	conium bioass	ay	3				
	tyrs	times after sh	not for Pu co	onc in urine		50.0	55.0	60.0		
			fiidos d	output						
	time	of measurement	16.0	hours						
	sf	scaling facto	or(10**14 fis	ssions [per m	**2, m**3])	9.91				
inver	tory of 1	50 fission prod	Augte 20 agt	ivation prod	uata 20 aa	tinides (ci/1	10**14 figgi	ong )		
IIIV CI.	1			4			7		9	10
0	1.877E-1	2 1.416E-07	1.364E-05	0.00	8.641E-12			0.00	3.988E-09	0.00
10	2.182E-1		9.683E-05		7.553E-21	1.281E-05		0.00	7.269E-08	2.611E-08
20	0.00		9.581E-06				0.00			7.725E-16
30 40	0.00 1.476E-1		1.710E-05 1.917E-21				9.206E-04 0.00	8.14/E-04 2.664E-05		3.730E-04 1.232E-17
50	0.00	0.00	3.285E-04	3.608E-04			1.455E-06	1.572E-13	0.00	1.919E-04
60	1.920E-0		1.782E-05	3.540E-10			1.753E-08	5.651E-06		7.036E-10
70	5.333E-1		5.533E-05		4.987E-08		1.954E-04	2.804E-06	5.174E-14	0.00
80	0.00		1.078E-14	2.532E-05				0.00	0.00	2.615E-04
90 100		4 0.00 7 7.917E-04	2.236E-08	9.889E-08 0.00	7.628E-13		0.00	4.052E-09	4.392E-07 1.050E-07	1.441E-09 0.00
110	9.031E-1				8.245E-05		1.271E-17		2.995E-05	6.959E-29
120	1.157E-0		4.850E-04				4.147E-08	0.00	4.255E-04	2.409E-23
130	7.861E-1		2.837E-23	3.824E-05	1.841E-08	0.00	1.738E-10	9.906E-11	9.763E-05	8.098E-05
140	1.361E-0	9 7.610E-15 3.964E-04		4.795E-12		1.010E-06				0.00
0 10	0.00	3.833E-06	0.00	0.00 1.024E-05	0.00	0.00	0.00	8.272E-05 0.00	0.00	0.00
0	0.00	2.267E-20	2.618E-14	0.00	1.380E-12	4.830E-14	1.287E-05	1.379E-12	9.396E-06	7.872E-15
10	5.663E-0	6 9.479E-06	8.980E-10	6.897E-08	2.743E-12	8.779E-09	2.569E-14	0.00	0.00	0.00
	0.044-04	+0+01+4 44	( a) (10-	**14 fii	\	1 2625 02				
	acttot	total activit	y(curtes/10	14 LISSIONS	,	1.262E-02				
		l dose commitme			time = $16$	.0 hours				
				hours						
		duration time	= 1.00	HOULS						
	with	duration time			nides(g+b)	actinides(	(a) to	tal		
	with fiss enals	ion products a	activation pr 4.985E-04	roducts acti	835E-07	4.975E-05	5 6.27	9E-04		
bone	with fiss enals e surf	ion products a 7.932E-05 2.785E-04	activation pr 4.985E-04 2.377E-04	roducts acti	835E-07 352E-05	4.975E-05 2.766E-02	5 6.279 2 2.829	9E-04 5E-02		
bone brai	with fiss enals e surf n	ion products a 7.932E-05 2.785E-04 5.391E-05	4.985E-04 2.377E-04 6.372E-05	roducts acti 4 2. 4 7. 5 1.	835E-07 352E-05 823E-07	4.975E-05 2.766E-02 4.975E-05	5 6.279 2 2.829 5 1.676	9E-04 5E-02 5E-04		
bone brai brea	with fiss enals surf in	ion products a 7.932E-05 2.785E-04 5.391E-05 6.611E-05	activation p 4.985E-04 2.377E-04 6.372E-05 5.598E-04	roducts acti. 4 2. 4 7. 5 1.	835E-07 352E-05 823E-07 557E-07	4.975E-05 2.766E-02 4.975E-05 4.975E-05	5 6.279 2 2.829 5 1.676 5 6.760	9E-04 5E-02 5E-04 0E-04		
bone brai	with fiss enals surf in	ion products a 7.932E-05 2.785E-04 5.391E-05	4.985E-04 2.377E-04 6.372E-05	roducts acti. 4 2. 4 7. 5 1.	835E-07 352E-05 823E-07	4.975E-05 2.766E-02 4.975E-05	5 6.279 2 2.829 5 1.676 5 6.760	9E-04 5E-02 5E-04		

Figure C-7. Example Problem 6 - Residence Island.

```
1.234E-03
                                 9.354E-05
                                                     3.648E-06
                                                                       4.975E-05
                                                                                       1.381E-03
 si wall
 uli wall
              3.910E-03
                                 1.250E-04
                                                     1.368E-05
                                                                       4.975E-05
                                                                                        4.099E-03
 lli wall
              5.918E-03
                                 1.740E-04
                                                     2.535E-05
                                                                       4.975E-05
                                                                                        6.167E-03
 kidneys
              7.358E-05
                                 2.103E-04
                                                     1.521E-06
                                                                       1.180E-04
                                                                                        4.034E-04
 liver
              8.503E-05
                                 4.542E-04
                                                     1.527E-05
                                                                       6.080E-03
                                                                                        6.635E-03
 et region
              9.910E-03
                                 2.965E-03
                                                     4.353E-05
                                                                       2 768E-04
                                                                                        1.320E-02
                                                                       6 099E-04
 lung
              6 363E-03
                                 3 953E-03
                                                     6 643E-05
                                                                                        1 099E-02
                                 2.320E-04
                                                                       4.975E-05
 muscle
              7.982E-05
                                                     2.587E-07
                                                                                        3.618E-04
              2.097E-04
                                 6.707E-05
                                                     1.416E-06
                                                                       3.686E-04
                                                                                        6.468E-04
 ovaries
              8.349E-05
                                 3.674E-04
                                                                       4.975E-05
 pancreas
                                                     2.907E-07
                                                                                        5.010E-04
              1.926E-04
                                 2.863E-04
                                                     3.076E-06
                                                                       1.364E-03
                                                                                        1.846E-03
 r marrow
 skin
              4.490E-05
                                 1.328E-04
                                                     1.851E-07
                                                                       4.975E-05
                                                                                        2 276E-04
                                                                       4 975E-05
 spleen
              7 138E-05
                                 3 948E-04
                                                     2.674E-07
                                                                                        5 162E-04
                                 2.479E-05
                                                     1.028E-06
                                                                       3.870E-04
              4.165E-05
                                                                                        4.545E-04
 testes
              9.302E-05
                                 6.317E-04
                                                     3.041E-07
                                                                       4.975E-05
                                                                                        7.748E-04
 thvmus
                                                                       4.975E-05
                                                                                        1.726E-02
 thyroid
              1.698E-02
                                 2.340E-04
                                                     2.110E-07
              1.187E-04
                                 5.176E-05
                                                     3.582E-07
                                                                       4.975E-05
                                                                                        2.206E-04
 uterus
 ubld wall
              3 721E-04
                                 4 377E-05
                                                     5.846E-07
                                                                       4.975E-05
                                                                                        4.662E-04
 eff dose
              2.485E-03
                                 7.332E-04
                                                     1.258E-05
                                                                       9.217E-04
                                                                                        4.153E-03
radionuclides contributing > 1% to effective dose equivalent
nuclide
             rem
           4.894E-05
sr-91
                        1.2
           5.403E-05
                         1.3
y-92
y-93
           1.314E-04
                         3.2
                         7.6
zr-97
           3.174E-04
mo-99
           1.281E-04
                         3.1
rh-105
           4.288E-05
                         1.0
te-131m
           4.158E-05
                         1.0
           2 367E-04
i - 131
                         5.7
           2.072E-04
te-132
                         5.0
 i-133
           5.126E-04
                        12.3
           9.619E-05
 i-135
                         2.3
ce-143
           1.409E-04
                         3.4
na-24
           5.340E-05
                         1.3
c_{0}-60
           6 773E-04
                        16 3
pu-239
           9.108E-04
                        21.9
    pu239 fraction in urine from inhalation exposure
                                                             uptake fraction=5.000E-02
time after shot (yrs)
                              50
                                         55
                                                   60
conc (ci/day) or (ci/1.41) 2.08E-18 1.98E-18 1.88E-18
         total of all measurements and exposures
          total dose commitments in rem for all intakes by DCF set
 Doses from Specified DCF File
DCF File Info: ICRP-72 Inhalation DCFs - Max dose from all particle sizes - 3-28-2006
          fission products activation products actinides(g+b)
                                                                      actinides(a)
                                                                                          total
 adrenals
                                                                                        6.279E-04
              7.932E-05
                                 4.985E-04
                                                     2.835E-07
                                                                       4.975E-05
                                                     7.352E-05
 bone surf
              2.785E-04
                                 2.377E-04
                                                                       2.766E-02
                                                                                        2.825E-02
                                 6.372E-05
 brain
              5.391E-05
                                                     1.823E-07
                                                                       4.975E-05
              6.611E-05
                                 5.598E-04
                                                     2.557E-07
                                                                       4.975E-05
                                                                                        6.760E-04
 breast
 st wall
              7.048E-04
                                 2.948E-04
                                                     1.957E-06
                                                                       4.975E-05
                                                                                        1.051E-03
                                                                       4 975E-05
 si wall
              1.234E-03
                                 9.354E-05
                                                     3.648E-06
                                                                                        1 381E-03
              3.910E-03
                                 1.250E-04
                                                     1.368E-05
                                                                       4.975E-05
                                                                                        4.099E-03
 uli wall
              5.918E-03
                                 1.740E-04
                                                     2.535E-05
                                                                       4.975E-05
                                                                                        6.167E-03
 lli wall
 kidneys
                                 2.103E-04
              7.358E-05
                                                     1.521E-06
                                                                       1.180E-04
                                                                                        4.034E-04
              8.503E-05
                                 4.542E-04
                                                     1.527E-05
                                                                       6.080E-03
 liver
                                                                                        6.635E-03
 et region
              9.910E-03
                                 2.965E-03
                                                     4.353E-05
                                                                       2.768E-04
                                                                                        1.320E-02
 lung
              6.363E-03
                                 3.953E-03
                                                     6.643E-05
                                                                       6.099E-04
                                                                                        1 099E-02
 muscle
                                 2.320E-04
                                                     2.587E-07
                                                                       4.975E-05
                                                                                        3.618E-04
              7.982E-05
              2.097E-04
                                 6.707E-05
                                                     1.416E-06
                                                                       3.686E-04
                                                                                        6.468E-04
 ovaries
              8.349E-05
                                 3.674E-04
                                                     2.907E-07
                                                                       4.975E-05
                                                                                        5.010E-04
 pancreas
 r marrow
              1.926E-04
                                 2.863E-04
                                                     3.076E-06
                                                                       1.364E-03
                                                                                        1.846E-03
              4.490E-05
                                 1.328E-04
                                                     1.851E-07
                                                                       4.975E-05
                                                                                        2.276E-04
 skin
 spleen
              7.138E-05
                                 3.948E-04
                                                     2.674E-07
                                                                       4.975E-05
                                                                                        5.162E-04
 testes
              4 165E-05
                                 2 479E-05
                                                     1 028E-06
                                                                       3 870E-04
                                                                                        4 545E-04
              9.302E-05
                                 6.317E-04
                                                     3.041E-07
                                                                       4.975E-05
                                                                                        7.748E-04
 thymus
```

Figure C-7. Example Problem 6 - Residence Island (continued).

```
thyroid 1.698E-02 2.340E-04 2.110E-07 4.975E-05 1.726E-02 uterus 1.187E-04 5.176E-05 3.582E-07 4.975E-05 2.206E-04 ubld wall 3.721E-04 4.377E-05 5.846E-07 4.975E-05 4.662E-04 eff dose 2.485E-03 7.332E-04 1.258E-05 9.217E-04 4.153E-03 pu239 fraction in urine from all exposures

time after shot (yrs) 50. 55. 60.

conc (ci/day) or (ci/1.41) 2.08E-18 1.98E-18 1.88E-18 end
```

Figure C-7. Example Problem 6 - Residence Island (concluded).

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